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THE CENTRAL VALLEY PROJECT, STATE WATER PROJECT AND SALINITY CONTROL IN THE SACRAMENTO-SAN JOAQUIN DELTA

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THE CENTRAL VALLEY PROJECT, STATE WATER PROJECT AND SALINITY CONTROL IN THE SACRAMENTO-SAN JOAQUIN DELTA

A Thesis
Presented
to the Faculty of
California State University, Chico

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts
in
Geography

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by

John MacLeod Mac Diarmid

Spring 1975

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16. Abstracts
California's Sacramento-San Joaquin Delta is formed at the confluence of the southward flowing Sacramento River and the northward flowing San Joaquin River where the waters join to flow into the Pacific Ocean via San Francisco Bay. Both the federal Central Valley Project and the State Water Project store water in the Sacramento River system and export it southward from the Delta. Water quality maintenance (salinity control) in the Bay-Delta system is accomplished by a hydraulic barrier sustained with reservoir releases in the otherwise low-flow (rainless) summer and fall periods. Water allocated to this purpose flows into the Bay and Pacific Ocean; it cannot be exported. This study presents the historic, social, economic, legal, institutional and engineering conflicts that surround these two competing water uses. In the planning and early development stages of the two projects, salinity control was listed as a beneficial purpose and used to justify the projects. As project water demands continued to build south of the Delta, the operators lowered their commitments to salinity control. In 1971 the State conditioned the projects' water diversion rights in the Delta to maintain adequate Delta water quality. This action of the State is now before the courts to determine it's reasonableness. Also, the courts are adjudicating the powers of a state agency to impose operation restrictions upon a federal project, the Central Valley Project, in the process of issuing water rights. Conflicts between the U.S. Environmental Protection Agency (EPA) and the U.S. Bureau of Reclamation (USBR) are also presented. EPA contends that pursuant to the Federal Water Pollution Control Act Amendments of 1972, the USBR must operate the Central Valley Project to meet federal water quality standards in the Delta. According to the USBR, this law does not apply to federal reservoirs. Thirty six sets of legal-institutional-engineering alternatives are identified and discussed.

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In the interest of making available to the public information on water quality issues to which it might not otherwise have access, the State Water Resources Control Board is publishing for library distribution this Masters Degree thesis, The Central Valley Project, State Water Project and Salinity Control in the Sacramento-San Joaquin Delta (California State University, Chico).

The findings reported herein are those of the author and do not necessarily reflect the opinion or policies of the State Water Resources Control Board.

PREFACE AND ACKNOWLEDGMENTS

It takes little imagination to realize the magnitude of the annual problems of winter floods and summer droughts that occurred in the absence of the flood conveyance facilities (Yolo By-Pass) and the large storage reservoirs now on the major streams. Runoff from prolonged winter rains rushed out of the steep Sierras to spread on the flat Central Valley floor. Floods were an annual occurrence except perhaps in the dry water years. But at the end of the spring snow melt in wet as well as dry years, the concern of too much water quickly became one of too little, under the clear, hot rainless summers of the Mediterranean climate. Early settlers predicted the population of the state would be severely limited due to the unproductivity of vast tracts of land without moisture and the fights over the exotic summer flows were appalling. The projects have changed all this. Large storage facilities hold back most of the winter floods and the remainder is issued through large flood flow bypasses paralleling the Sacramento River. Erstwhile flood flows become irrigation, municipal and industrial supplies and the economy of the state thrives off the $8 billion plus agricultural enterprise. The projects are a tribute to the dedication of so many who make them possible. But no such undertaking is without mistakes, mismanagement and problems. This thesis is directed towards these problems and the benefits of the projects are identified here as they will seldom rise again in the following pages.

The reader will notice the dearth of personal interviews in the bibliography and instead an almost complete reliance on the written word. This was done with a purpose in mind. Early in the formulation stage of the thesis topic I visited with Bureau and DWR officials in Sacramento to gain insight on the overall problem. These gentlemen answered every question in a totally cooperative spirit. However, in the beginning my knowledge was too limited to ask the correct questions and the impressions of these exchanges incorporated the agencies' bias. Thus, documents and speeches were extensively used and the thesis contains no "behind the scenes" information. Such an approach severely limits an excellent source of information but in water resources controversies, the source is often more important than the information. A trade off was made; personal information was traded for the desire to be as objective as possible. A lot has been written about water resource development and the Delta; some is unintentionally wrong. And while I have endeavored to record the saga as truthfully as possible, I may have midjudged the accuracy of the many sources plus there is also the chance of misinterpretation. Should the reader discover such I would appreciate it being called to my attention.

After graduation from East Carolina University in 1967, I took a Principal-Teacher-Bus Driver position in a two room school at the confluence of the Salmon and Klamath rivers in Siskiyou County, California. In the summers between the two school years there and another year in a two room school at the base of the north face of Mt. Shasta, I attended summer school at Oregon State University. It was there that Keith Muckleston of the Geography staff introduced me to Arthur Maass' Kings River Project controversy (N. 276 Infra). As a naive student I found it difficult to believe that the two federal agencies of the Executive branch, the Bureau and the Corps, would so openly compete for a project; I was particularly impressed by the arrogant attitude of the Corps. The study lent substance to all those cowboy shows I saw as a child in the humid east... maybe they were fighting over the water hole. I didn't perceive it then for in the Coastal Plan of the Southeast U.S., land is the scarce resource; water is abundant. Academic adrenalin stirred by Maass' study never really settled down.

I was exposed to the Peripheral Canal controversy by the media when Garner Ted Armstrong, a radio commentator, unleashed a blasphemous attack on the project. The project fermented and when I started the MA program in Geography at CSU, Chico, there was no doubt about a thesis topic. Wisely, the professors discouraged the idea. They reasoned the controversy was too political and complex for an MA thesis and the Chico Library was too limited to support the necessary research. They were right on all three points, but Dr. Ladd Johnson and Dr. Margaret Trussell pledged their support. None of us realized the size of the commitment then and I will be forever grateful for their patience, cooperation, support and assistance through this three year ordeal.

In the Spring of 1972, after the completion of the necessary course work, I left the campus to begin employment. At this time a draft of the first chapter and the outline were approved in concept. The original outline contained five chapters; the first two remained the same but Chapter III, which was to consist of the Central Valley Project and the State Water Project, slowly evolved into four chapters. The original Chapter IV was to be The Peripheral Canal but the topics therein became Chapters VII and VIII.

Through much of the writing, we were constantly faced with the alternative of trimming the topic and finishing the thesis for the completion of the MA program, or continuing in the original scope. The first was tempting but the original intent was sustained to fill a gap in the recording of California's water resources development. Much of the material contained herein has never been collected and presented around the Delta water quality controversy. Also, it became obvious that much of the material written about the controversy is incorrect, either by design or lack of information. The size of this thesis represents the complexity of the Delta controversy.

The thesis has been written in evenings, weekends and vacations, as I have been working full time since I left the Chico Campus. First I worked as a graduate student assistant with the State Water Resources Control Board for 8 months. This should not imply support or endorsement of the thesis by the State Board. I was expressly directed not to work on the thesis while on the job; there was much too much official work to go around. In February, 1973, I left the State Board to join the staff of my present employer, Brown and Caldwell, Consulting Engineers. Here again there was neither the budget or the time to support such an extensive academic study. However, I have been able to utilize both the typing pool for drafts and the drafting staff for figures during lulls between company projects. I am extremely grateful for this privilege but this thesis should not in any way be associated with Brown and Caldwell.

To anyone even remotely associated with the writing of a thesis, the announcement that many people have helped along the way is an understatement. In addition to Dr. Johnson and Dr. Trussell acknowledged above, there have been several librarians, typists, draftsmen and others who have lent vital support. Personnel in the U.C. Berkeley Documents Library were extremely helpful in retrieving the many documents used in this thesis. Mary Dean, the Associate Librarian at the Water Resources Center Archives at U.C. Berkeley was a constant provider of obscure documents and reports. This library is a tribute to the water resources of the state and the many people in the past and present who have contributed their personal collections to this library. Eleanor Mundorff at Brown and Caldwell was always able to somehow work the drafts into the typing schedule. In the closing months the thesis gained phantom status in the typing pool as the end continued to evade us.

Joan O'Hare did most of the Tables. I am sincerely indebted to Tina Davis in Mill Valley who typed the final copy. Francis Bolton, Ray Louie, and Sally Warburton applied their professional diligence to the drafting of the figures.

I am extremely grateful and fortunate to have had the persistent personal support of Kathren, Kathy and Patti. The size of this project is exceeded by the many personal sacrifices made by Patti during the two years of course work and three years of thesis preparation.

DEDICATION

This thesis is dedicated to Angel, Clawson, Engle, Hansen, McGauhey, Montgomery, Thompkins and Thompson, whose works set the standards and established the base for this thesis.

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ABSTRACT

THE CENTRAL VALLEY PROJECT, STATE WATER PROJECT AND SALINITY CONTROL IN THE SACRAMENTO-SAN JOAQUIN DELTA

by

John MacLeod MacDiarmid

Master of Arts in Geography

California State University, Chico

Spring 1975

Water flowing into the Sacramento-San Joaquin Delta from the Sacramento River to the north has three uses; 1) in-Delta uses, 2) exportation by the Central Valley and State Water projects' pumps located on the southern rim of the Delta and 3) salinity control by maintaining a hydraulic barrier against the potential salinity incursions that press inward on each high tide. Water allocated to salinity control flows out to the ocean via San Francisco Bay, thus it cannot be recaptured for other uses.

Salinity control was listed as a major purpose of Shasta Dam in the planning for the state Central Valley Project. The federal Bureau of Reclamation sustained this purpose when they took over the project in 1935, but in 1957 the present policy was established when the Regional Director disavowed any salinity control responsibility. Salinity control did not play as significant a role in the development of the Department of Water Resources' California Water

Plan (1957) and State Water Project (1951). Nevertheless, the planning documents for the project do give some attention to salinity control and the Delta Protection Act directs the SWP planners to consider the beneficial water uses in the Delta.

With the present system of exportation, the projects must maintain high Delta outflows to protect the quality of the water at the export pumps. Salinity control is a function of the export system. To assure the quality of future large amounts of export water, the project operators' purpose to construct a large 43 mile Peripheral Canal that will divert water from the Sacramento River, skirt the eastern Delta and deliver it to the pumps. Twelve release points along the canal will allow for salinity control, but the issue at hand is how much water should be released from the canal to maintain what water quality level?

After two years of hearings and deliberation the State Water Resources Control Board issued (1971) interim water rights decision 1379 requiring the projects to maintain a water quality level almost twice that proclaimed by the two project operators. The decision has been set aside while the courts rule on the reasonableness of the decision. Also a case has developed over the State Water Resources Control Board's authority to condition water rights issued to the federal Bureau of Reclamation.*

The problem of Delta water quality, salinity control, is older than the two projects that have solved many of the water problems in the state. Given the pace at which the courts act, it will be several years before the problem is resolved. The basic philosophical question at issue is what is a beneficial water use. Is it more beneficial to allocate several thousand acre feet of water to instream uses in the Delta or should this water be put on the land?

---

*Subsequent to the publishing of this thesis, the U.S. District Court ruled in favor of U.S. on October 9, 1975. In November the State Water Resources Control Board moved to appeal Judge Thomas McBride's decision.

CHAPTER I

FRAMEWORK OF ANALYSIS

> The role of the Delta in the State Water Resources Development System is analogous to the switchboard of a telephone system. As all the calls come to the switchboard and must be routed on, so will the water supplies of the... system come to the Delta and then be routed for internal use and on to the west and to the south. As the switchboard is in the middle of the telephone system, so the Delta is in the middle of our water system — both operationally and geographically.
>
> Harvey O. Banks, 1960
> in Cooper N. 4 Infra.

INTRODUCTION

The first half of this chapter consists of a statement of the problem and objectives as well as a brief outline of each chapter. The second half of the chapter describes the present physical and cultural patterns in the Delta. This introductory chapter will set the stage for an evaluation of the Central Valley water resources development schemes that are superimposed upon the Delta setting.

STATEMENT OF PROBLEM

Pursuant to Delta water quality maintenance reservations incorporated in the water rights issued to the Central Valley Project and the State Water Project, the State Water Resources Control Board opened hearings in 1969 to reconsider Delta water quality standards. Two years and 11,700 pages of recorded testimony later, the Board issued interim Decision 1379. Water quality standards in this decision will require the two projects to maintain a high Delta outflow for water quality control. Both operators -- the state Department of Water Resources and the federal Bureau of Reclamation-- have voiced strong opposition to the decision. Water that flows out of the Delta cannot be exported to service areas south of the Delta and large reservoir releases will be necessary to firm up the natural outflows in the low flow summer period. The Department of Water Resources has stated that it will not be able to meet the standards and its contracted deliveries. The Bureau takes the position it cannot obey any state decision that adversely impacts upon the operation of a federal project as authorized by Congress. Customers of the state water project have successfully filed a temporary restraining order against the implementation of the standards. A court case over the reasonableness of the standards has been suspended until the courts rule on the question of the authority of the State Water Resources Control Board over the federal CVP in United States v. California. This set of apparently irreconcileable circumstances gives rise to several questions, including the following:

1. What role did Delta water quality maintenance play in the planning of the state and federal projects?
2. How do the projects' present Delta Water Quality policy compare with that developed in the planning process, and that developed by the State Water Resources Control Board?
3. What impact will the new standards have on the two projects and the northern California water industry?

OBJECTIVES

In addition to answering the above questions this thesis will examine the conflict between the water quality and water rights branch of the state government on one hand and the state and federal water purveyors on the other. This is an age old conflict of environmental vs. economic concern cast in the contemporary setting of the Delta water quality controversy. Does the beneficial and reasonable use clause of the state Constitution imply that the beneficial water uses (including fish and wildlife) in the Delta should be protected with large Delta outflows or should these outflows be salvaged and utilized to provide food and fiber?

A major objective of this thesis is to present the background information necessary for the reader to answer the above question. With the exception of a few isolated works, most water resources publications are often tainted by the writer's bias. There can be no doubt that an element of ad hominem has crept into this work, but the writer has made every effort to present the problem in an objective manner.

In general, the first eight chapters present the controversy with a minimum of analysis. However, the complexity of the materials considered necessitates the simultaneous presentation of some opinions, criticism or deductions; such interpretations have been kept at a minimum in the first eight chapters and are easily identified. The purpose of Chapter IX is to summarize and correlate the problem and present the writer's conclusions.

Chapter I is a brief introduction to the problem and the Delta setting. Physical and cultural patterns are identified. Chapter II presents the history of the Delta development, historical and present flooding problems plus the historic salinity incursion phenomena. Chapter III recreates the atmosphere in which the Central Valley Project was created and the attempts by the state to acquire federal assistance for the state project. Also considered is the planning for salinity control with the state envisioned CVP. Chapter IV begins with a brief description of the federal Buearu of Reclamation CVP as it exists today, followed by a presentation and analysis of federal authorization. The chapter closes with a section on the Bureau's salinity control policy formation and a very brief discussion of the CVP financial status and policy. Chapter V considers the rebirth of state water resources planning and development. Events leading to this rebirth are described and the development of the California Water Plan is traced. Special emphasis is given to the salinity control element of the plan. Following a general description of the State Water Project, Chapter VI discusses the development of the project, including the financial program and salinity control considerations. A final section cursorily examines the present financial status and repayment policy of the project.

In many respects the first six chapters set the stage for the information presented in Chapters VII and VIII. The contemporary topics of physical solutions and institutional solutions are presented in these chapters. Chapter VII presents the alternative physical projects considered for protecting water quality and a description of the Peripheral Canal. The status of the proposed project at the completion of this thesis in May 1975 also is identified. Chapter VIII considers the institutional arrangements or solutions for maintaining Delta water quality. This section has two major subsections, 1) the establishment of Delta water quality standards through the granting of water rights to the two projects and 2) the establishment of Delta water quality objectives pursuant to federal and state antipollution statutes. Legal actions filed in the aftermath of the Delta water rights decision terminate the chapter.

A brief review of the Delta water quality controversy leads off Chapter IX, the concluding chapter. The writer then presents his personal analysis of the problem and other observations made in the course of writing the thesis. The last section points out the unsettled nature of the Delta water quality controversy and the alternative futures that may be anticipated.

LIMITATIONS

Of the numerous works read, ideas from over 300 were incorporated into this thesis. Several other publications pertinent to this study exist but it was impossible to utilize all due to time restrictions, access difficulties, and lack of academic background in certain specialized fields.

Geographers are interdisciplinary by nature and vocation, but no didactic program could prepare one for all the ecological, economic, legal, sanitary and hydraulic engineering fields that are involved in the Delta controversy. The writer has utilized a "learn as you go" approach, but given a finite time constraint there is an obvious limitation to this method.

Since the historical consideration of Delta water quality has been related to irrigation, water quality for agriculture receives a major emphasis in this thesis. Ecological considerations are probably as much or more pertinent in the contemporary setting but offer little in portraying the historical pattern of salinity control policy formation. Moreover, the previously mentioned limitation of lack of academic background is especially pertinent to the biological sciences as they apply in the Delta system.

One additional limitation should be identified. Water quality criteria for agriculture will be treated but this writer will not attempt precisely to evaluate the various criteria for all the beneficial uses. Rather, this thesis is limited to a presentation and analysis of the decision making process for Delta water quality management.

DESCRIPTION OF THE AREA

This section explains the contemporary setting of the Delta. Transpotation and other patterns are described as well as activities in the area and the central location of the Delta for water transfers.

Central Location of Water Transfers

The Delta is geographically and operationally in the center of the federal Bureau of Reclamation's Central Valley Project, and the state Department of Water Resources' State Water Project. These two projects transfer water from the water surplus north to the water deficit south. The system is illustrated in Fig. 1 attached to the inside back cover.

Agriculture uses 85 per cent of the developed water supply in the state and the San Joaquin Valley, located south of the Delta, is one of the nation's most productive agricultural areas with Fresno, Kern and Tulare counties among the top five counties in the nation. Only five states match or exceed the value of the valley's enormous output.[1] Productive soils, a long growing season, hot summers, and irrigation water make possible the high value cultivation.[2]

Similarly, the majority of the population of California is south of the Delta. Over one-half of the twenty million Californians live in the South Coast Region from Santa Barbara to San Diego.[3]

The natural occurence of water in the state for use is maldistributed in time and space. Water is needed in the hot, dry summers but precipation and runoff is concentrated in the winter. In space, two-thirds of the water is in the northern third of the state and, as indicated, the major agricultural and municipal demand is in the south.[4]

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[1] David W. Lantis, Rodney Steiner, and Arthur E. Karinen, California: Land of Contrast (Belmont, California: Wadsworth Publishing Company, Inc., 1970), p. 384.

[2] The San Joaquin Valley contains four-tenths of the irrigable land in California and five-tenths of the irrigated land; California Department of Water Resources (Hereinafter cited as DWR), San Joaquin Master Drain, Bull. No. 127, January 1965, p. 1.

[3] Lantis, California, p. 100.

State and federal water harnessing projects store a portion of the winter and spring runoff in reservoirs located in the Sacramento Valley (See map inside back cover). Releases flow down the Sacramento River and into the Delta where it has three uses. A portion is used to repel the saline Bay waters from encroaching into the Delta during high tide and some of the water is used in the Delta for municipal and irrigation uses. A substantial amount, however, is pulled to the south side of the Delta where it is pump-lifted to the conveyance canals of the state and federal projects. The water allocated to salinity control flows into the Bay and is considered "lost" by the project's operators,as it cannot be marketed. Therefore, understandably, large salinity control releases tend to undermine the economic and physical feasibility of the projects.

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[4] State Water Resources Board (hereinafter cited as WRB), Water Resources of California, Bull. No. 1 (hereinafter cited as Bull. 1), (1951), p. 22. Agriculture dominates Municipalities and Industries (M. and I.) as a user of water in the U. S. Cooper states that the amount of water used by one man in 65 years is equivalent to the amount of water used to irrigate 5 acres of cotton in one season; Erwin Cooper, Aqueduct Empire: A Guide to Water in California, Its Turbulent History, Its Management Today (Glendale, California: The Arthur H. Clark Company, 1968), p. 281. More qualified figures are available. The U. S. Geological Survey estimates that 60% of the nation's water is used by M. and I. while 40% is used for agriculture. Much of this water is returned and not consumed. Agriculture consumes 85% of the water used in the United States: Ralph E. Olson, A Geography of Water (Dubuque, Iowa; Wm. C. Brown Company Publishers, 1970), pp. 2, 3.

Location, Size and Boundaries of the Delta

The Sacramento-San Joaquin Delta is located in the low-lying region of the anastomatic confluence of the Sacramento and San Joaquin Rivers. The 400 mile Sacramento River originating in the Klamath Mountains to the north, drains a 26,548 square mile basin[5] with a 22.39 million acre feet (MAF) average annual discharge.[6] The 350 mile San Joaquin River originates on the west side of the Sierra Nevada Range and drains a 15,946[7] square mile basin with a 7.93 MAF average annual discharge.[8]

The two streams are the principal drainage features in the 450 mile Central Valley of California and they unite at the Delta. Thus, the total runoff for the Central Valley is marshalled through the Delta before it passes through Carquinez Strait and into the Pacific Ocean via San Francisco Bay and the Golden Gate.

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[5] SWRB, Bull. No. 1, p. 309.

[6] Ibid., p. 39. Million acre feet is a volume measurement equal to the amount of water necessary to cover a million acres of land 1 foot deep. This amounts to 325,851 gallons (1 AF x 10^6). The 22.39 MAF of the Sacramento accounts for 31.6 per cent of the 70.80 MAF runoff for the State. And, together with the coastal streams north of San Francisco, accounts for 72.4 per cent of the total runoff for the State.

[7] Ibid., p. 310.

[8] Ibid., p. 39. The Cosumnes, Mokelumne and Calaveras Rivers deboutch into the myriad of sloughs and channels of the Delta between the Sacramento and San Joaquin Rivers. For convenience, their drainage area of 4,154 square miles and their combined discharge of 1.55 MAF is included in the San Joaquin River figure.

Most researchers are in agreement that the Delta is triangular in shape with Sacramento, Stockton and Antioch as apexes (See Fig. 2). They are in disagreement as to its size. This disagreement is due to the different criteria used and the subtle transitional nature of the boundaries which cause the Delta to be difficult to delineate. (See Table I)

The 488,000 acre discrepancy between the "largest" Delta and the "smallest" in Table I illustrates that the Delta possesses no visible physical boundaries and the transition is difficult to perceive. Yet, the Delta is unmistakably an area. "Topographic and edaphic similarities, together with land use patterns, strengthen the concept of the delta as being distinct from the adjoining valley plains."[9]

The median size of the Delta, as shown in Table I, is 425,000-435,000 acres. For the purpose of this study, the Delta consists of approximately 425,000-435,000 acres with boundaries as varying and "...indistinct as the ebb and flow of its tides and

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[9] John Thompson, "The Settlement Geography of the Sacramento-San Joaquin Delta" (unpublished Ph. D. dissertation, Stanford University, 1957), p. 21.

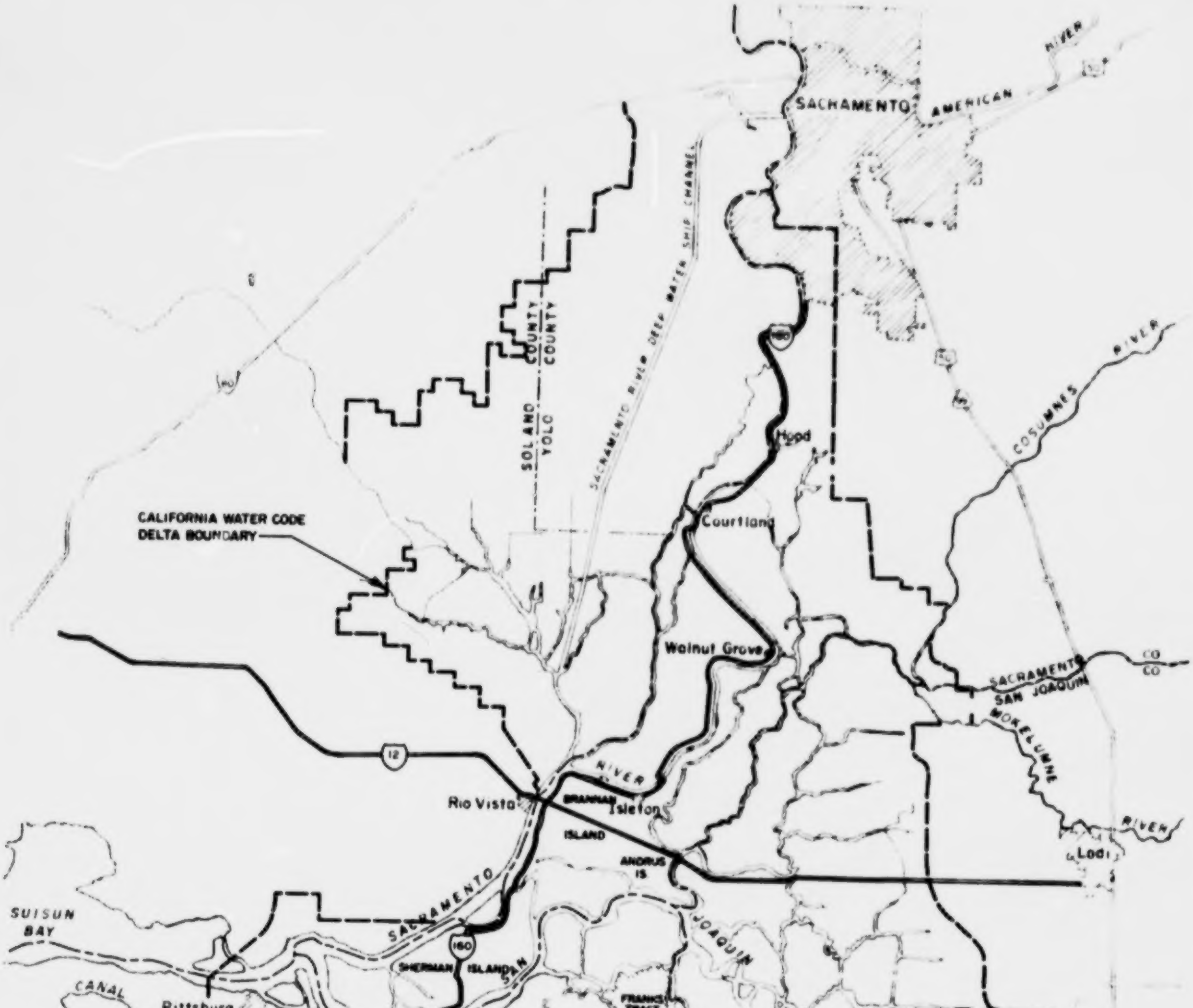
SACRAMENTO
AMERICAN RIVER
SOLANO COUNTY
YOLO COUNTY
SACRAMENTO RIVER DEEP WATER SHIP CHANNEL
COSUMNES RIVER
Hood
Courtland
CALIFORNIA WATER CODE DELTA BOUNDARY
Walnut Grove
SACRAMENTO CO
SAN JOAQUIN CO
MOKELUMNE RIVER
12
160
RIVER
Rio Vista
BRANNAN ISLAND
Isleton
ANDRUS IS
Lodi
SUISUN BAY
SACRAMENTO
SHERMAN ISLAND
JOAQUIN
FRANKS TRACT
RIVER
CANAL
Pittsburg
Antioch
CONTRA COSTA
4
OLD
STOCKTON
MIDDLE
RIVER
STATE'S DELTA PUMPING PLANT
CVP TRACY PUMPING PLANT
RIVER
CONTRA COSTA COUNTY
ALAMEDA COUNTY
Tracy
50
CALIFORNIA
DELTA - MENDOTA
AQUEDUCT
SAN JOAQUIN CO
ALAMEDA CO
SCALE IN MILES
0 2 4 6 8
Livermore
N

FIGURE 2 THE DELTA

TABLE I

PERCEPTION OF THE DELTA AREA

Researcher	Criteria	Size of Delta (in acres)
[10] California Legislature	Lands irrigated with water from the Delta	738,000
[11] Thompson	10-foot contour	535,000
[12] State Water Resources Board	Not stated	500,000
[13] Lantis	Not stated	490,000
[14] McClain	Area associated with the characteristic Delta crops and irrigation method	425,000 - 435,000
[15] Harding	Irrigable area in the Delta	400,000
[16] Nuttonson	A distinct geographical unit, as to physiography, soils, and agriculture	307,840
[17] Weir	Not stated	250,000

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[10] California Water Code, Section 12220.

[11] Thompson, Settlement Geography, p. 2.

[12] SWRB, Report on Feasibility of Feather River Project and Sacramento-San Joaquin Delta Diversion Projects Proposed As Features of the California Water Plan, May, 1951, p. 37.

[13] Lantis, California, p. 377.

[14] M. H. McClain, "Distribution of Asparagus Production in the Sacramento-San Joaquin Delta" (unpublished M.A. thesis, University of Calibornia, Berkeley, 1954), p. 2.

[15] S. T. Harding, Water in California (Palo Alto, California: N-P Publications, 1960), p. 144.

[16] M. Y. Nuttonson, The Physical Environment and Agriculture of the Sacramento-San Joaquin Delta Region of California with Reference to Similar Peat Soil Areas of the Hula Region of Israel (Washington, D.C.: American Institute of Crop Ecology, 1963), p. 1.

[17] Walter W. Weir, "Subsidence of Peat Lands of the Sacramento-San Joaquin Delta, California," Hilgardia, Vol. 20, No. 3 (June, 1950), p. 37.

the fresh water flows that advance and retreat with the annual runoff."[18]

Physical Patterns of the Delta

While it is not the primary purpose of this research to consider the physical characteristics of the Delta in detail, it is desirable to give attention to the characteristics that have effected and continue to effect cultural patterns in the Delta.

The word "delta" is derived from the Greek letter Δ. When a stream empties into a body of water, such as a lake or ocean, its velocity is reduced along with its sediment transporting capacity. As a result the sediment settles out, often forming a delta pattern from the debouchment. Such is, for example, the pattern of the Mississippi and Nile River mouths.

The Sacramento-San Joaquin Delta conforms to the typical delta pattern in two respects; it is triangular in shape and it is an area of sea level-controlled sedimentation. The similarities, however, are out-weighed by the dissimilarities and the term "delta" for the study area is in effect a misnomer.[19] Most deltas fan out from the point of debouchment. The Sacramento-San Joaquin Delta, however, has two points of debouchment as it is formed by two rivers from opposite directions. Furthermore, the Delta is not growing seaward. The Montezuma Hills and the Diablo Range (both of the Coast Ranges) restrict the Delta on the seaward west side.

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[18] Charles R. Goldman, "Biological Implications of Reduced Freshwater Flows on the San Francisco Bay-Delta System," in California Water, ed. by David Seckler (Berkeley: University of California Press, 1971), p. 109.

[19] Roy J. Shleman, "The Quaternary Deltaic and Channel System in the Central Great Valley, California," Annals of the Association of American Geographers, LXI (September 1971), p. 429.

In its antiquity, the Delta was a flat, sea level swamp. Vegetation patterns, responding to soil moisture, mirrored the slight relief. Along the stream channels natural levees supported cottonwood trees but elsewhere the moister flat Delta was dominated by tules and reeds. The vegetation was preserved in peat beds. Underlying Sherman Island in the western Delta, the peat occurs in depths to thirty feet (or fifty feet below mean sea level). Thinning to the east, it also underlies the modern Sacramento, San Joaquin and Mokelumne Rivers.[20] In recreating the peat formation conditions, the researchers are at odds. Shlemon feels that the vegetation was inundated and preserved by the slowly rising post glacial sea level; the collection of plant remains paced the rise in water level.[21] Cosby, however, feels that the sea level remained relatively constant and the slow accumulation of plant remains was

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[20] Ibid., p. 430.

[21] Ibid., p. 440.

was equal to the rate of subsidence.[22] Minerals transported by the stream dissect and mix with the peat, especially on the peripheries of the main streams. With reclamation, burning and tilling of the peat, mineral, mineral organic and organic soils have been formed. Nuttonson lists forty-two types of soils, but "...the delta soils are distinguishable as a group from the valley soils."[23]

Man has been a dominant agent in transforming the physical patterns of the Delta into their present alignments. Slight natural levees existed along the major streams entering the Delta. With reclamation, these have been heightened and strengthened to provide protection from major floods. Today there are approximately 50 islands, ranging in size from 1,000 to 23,000 acres, protected by levees 25 to 30 feet high.[24] The levees are made predominantly from the mineral soils in the channels as the peat soils do not compact well. The levees protect the interior organic soils from inundation. However, when these soils are exposed to the atmosphere they oxidize. Aided by burning, tilling, and wind erosion, the oxidation has resulted in subsidence. The rate of subsidence is three inches a year[25] and some of the interiors of the saucer shaped islands are now 5 to 20 feet below sea level.[26]

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[22] Stanley W. Cosby, Soil Survey--The Sacramento-San Joaquin Delta Area, California. United States Department of Agriculture Bureau of Public Information Series, 1935, No. 21, 1941, p. 18. The Dachnowski-Stokes study is in general agreement with Cosby. The vegetation, however, is believed to have grown in floating mats and the dead vegetation collected on the bottom; Dachnowski-Stokes, Peatland in the Pacific Coast States in Relation to Land and Water Resources. U. S. D. A., Miscellaneous Publication No. 248, October, 1939. The present rate of subsidence is over 3 inches a year but it is probably due to man's activities in the Delta, Infra. N. 27, 28. For a more detailed geologic analysis, see: N. L. Taliaferro, "Geographic Guidebook of the San Francisco Bay Counties, ed. by O. P. Genkins, California Division of Mines Bulletin 154 (1951), pp. 75-94. Also, G. D. Landerback, "Geologic History of San Francisco Bay," Ibid., pp. 117-150.

[23] Nuttonson, The Physical Environment and Agriculture of the Delta, Table 4, p. 12.

Paralleled by levees, the interwoven sloughs and channels of the Delta have an aggregate length of 700 miles. Floods in the Delta before reclamation, occurred in most years, usually in the winter and spring and when the discharge tapered off in the late summer and early fall in below-average discharge years, the saline bay waters migrated upstream. The extent and duration of the salinity incursion[27] under natural conditions has not, however, been determined.

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[24] United States Department of the Interior, Bureau of Reclamation (hereinafter cited as BOR), Peripheral Canal Unit: Feasibility Report (June, 1969), p. 7.

[25] Nuttonson, The Physical Environment and Agriculture of the Delta, p. 29.

[26] California Department of Water Resources (hereinafter referred to as DWR) The Delta and the State Water Project, unnumbered Memorandum Report, (June, 1969), p. 7.

[27] The term incursion refers to sea water migration into an estuary; intrusion refers to ground water invasion.

Cultural Patterns in the Delta

With an annual harvest valued at over $140,000,000, agriculture is the dominant economic activity in the Delta.[28] Productive organic soils, an unlimited supply of water and water transportation are positive factors that outweighed the negative factor of reclamation and re-reclamation after major floods. For reclamation to be successful, entire islands or tracts had to be reclaimed with large expensive levees. This large financial expense ruled out the "family farm" in the Delta and therefore, much of the land is owned by corporations.

Close to the populous San Francisco Bay Area as well as to Sacramento and Stockton, the Delta provides over 2,000,000 annual boat recreation days.[29] Boat cruising, fishing and water skiing account for a major portion of the days, but hunting also contributes 106,000 boat recreation days.[30] Table II gives a breakdown of the recreational facilities in the Delta and Fig. 3 illustrates a boat launching facility on Steamboat Slough.

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[28] DWR, Multiple-Purpose Levee System for the Sacramento-San Joaquin Delta, Preliminary Report (February, 1970), p. 1.

[29] One boat recreation day represents one day or part of a day spent by one recreationist in a boat. DWR, Recreation, Appendix to Bull. No. 76, Delta Water Facilities (August, 1962), Table 13, p. 33.

[30] Ibid., Table 12, p. 32.

The large demand made upon the Delta by the recreation is impressive considering the small population that lives in the Delta. However, this is largely due to the adjacent location to the Bay Area. San Joaquin County recreationists register the most recreation days in the area but Alameda, Santa Clara and San Mateo Counties collectively account for one-third of the total 3,000,000 recreation days.[31] Clearly the Delta is a valuable playground for the large San Francisco Bay Area aquatic recreationists. As is typical, however, an increase in recreation will increase problems incurred with the growers. Boats create waves which increase the rate of levee erosion.[32] The Department of Water Resources has proposed a multi-purpose levee program. It would maintain the levees in exchange for public access rights. However, such a program is bound to be expensive and it is unclear how financing would be handled.[33]

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[31] By 1980, it is estimated the Delta will account for 5,175,000 recreation days, Ibid., Plate 7. This figure proved to be overly conservative; 5,340,700 recreation days were recorded in 1970 and 7,595,700 days were projected for 1980. The State Delta Master Recreation Plan Task Force, Delta Master Recreation Plan, February, 1973, p. IV-6.

[32] The Sacramento Bee (Sacramento), July 19, 1970, p. 24.

[33] DWR, Multiple-Purpose Levee System, p. xiii. Four alternative plans from do nothing to various degrees of levee

TABLE II

SUMMARY OF DELTA RECREATION ACCOMMODATIONS

Facilities	Number
Public Facilities	
Resorts	101
Municipal Ramps	4
Municipal Marinas	2
State Parks	2
Total	109
Private Clubs	14
Total Facilities	123[a]

DWR, Recreation, Appendix to Bull. No. 76, Delta Water Facilities, Table 4.

[a] This figure is escalating rapidly. About 150 boat marinas with 10,000 berths have been identified in the Delta. The Delta Master Recreation Plan Task Force, Delta Master Recreation Plan, February, 1973, p. IV-6.

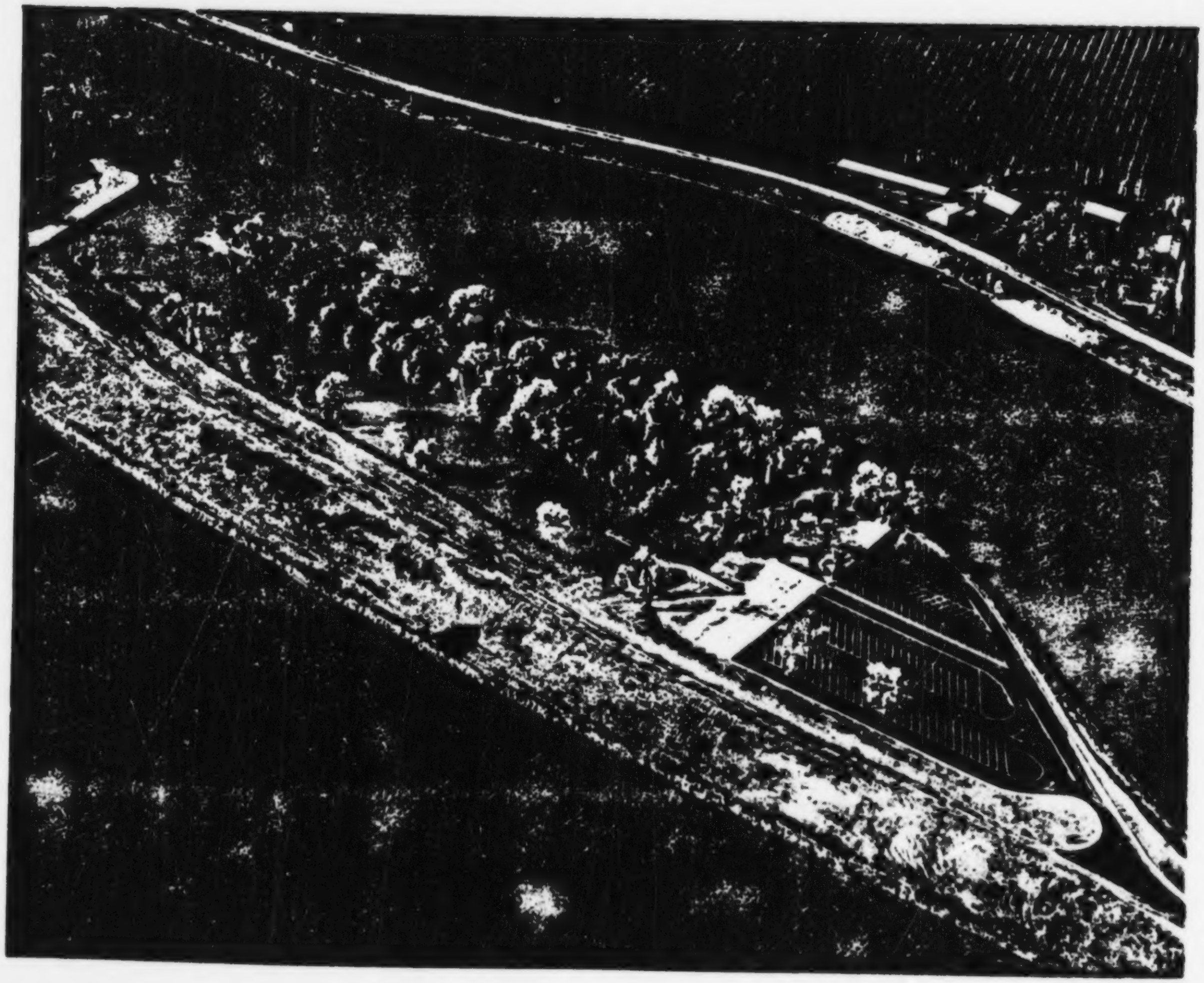

FIGURE 3. Hogback Island aquatic park and recreation site on Steamboat Slough of the Sacramento River. This facility was constructed by the U.S. Army Corps of Engineers and it is maintained and operated by the State Reclamation Board (Photo courtesy of U.S. Army Corps of Engineers, Sacramento Division.)

Residences are scattered throughout the Delta, but most growers commute from peripheral communities such as Rio Vista, Stockton, Tracy and Antioch. Communities are noticeably absent from the Delta. The few existant towns in the Delta owe their existance to their advantageous location as trade and transportation nodes. Walnut Grove, in the north, is located at the head of Andrus, Tyler and Staten Islands while Isleton, on the Sacramento, once functioned as a packing center.[34]

Two contemporary residential developments, Bethel Island and Discovery Bay, deserve special attention. Bethel Island in the southwest portion of the Delta contains approximately 2,000 people. The western half of the island is occupied by a large dairy ranch but the eastern half is experiencing urban sprawl. Houses and resorts occupy the levee periphery and the interior is spotted with trailer parks and a country club. Water front lots are narrow and long (probably 60' x 120', the county minimum) and sell for approximately $15,000. To this price utilities and levee upkeep must be added. Levee maintenance should be a concern of everyone on the island but of the three people casually interviewed, none was concerned. One man interviewed showed where his area's

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improvements were identified in the 1973 study. DWR, Delta Levees: What is Their Future, September, 1973.

[34] Thompson, Settlement Geography, p. 426.

group of homeowners had riprapped (rocked, see Fig. 4) the levee on the channel side to prevent wave erosion. He further stated, with an unswaying resolution, that he had watched the water level "pretty close" for a few years and there was "no chance" of overtopping. Another resident, who daily commutes 35 minutes to Livermore, was confident the levees were adequate all the way around. "Anyway," he stated, "if they build that peripheral canal and deepen the Stockton deep water channel, the water level will go down two feet!"[35] In summary, the geographic perception of the new Delta resident is similar to that displayed by the early reclamationist as described in the next chapter.[36] The levees on Bethel Island do not meet the minimum requirements set forth by the Army Corps of Engineers. In fact, the levees could be overtopped with a 30 year flood.[37]

Seven miles south of Bethel Island is a 1,763 acre development, Discovery Bay. Two years old, the development is programmed for 10,000 people on 3,200 water front lots. There is a distinct difference between reclamation of Discovery Bay and other Delta Islands. Other islands are saucer shaped with the interiors below sea level. Residences are usually on the levees but on Bethel Island there are several trailers located in the interior, below sea level. The Discovery Bay development has excavated large lakes and used the spoil to build up the land. In fact, this land is of sufficient height that levees are not used. Lots sell from $9,000 to $19,000 which includes all utility hookups.[38] Even the most casual observer can detect land subsidence in the Delta. Roads subside unevenly so that they contain dips in various degrees. Highway 4 and Bixler Road, between the valley and Discovery Bay, indicate subsidence by their unevenness. Thus, Discovery Bay residents can anticipate subsidence in the future. At what time the home sites will become susceptible to floods due to subsidence is presently unknown.

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[35] Bethel Island, California, interview with residents, March 25, 1972.

[36] Early reclamationist considered the Delta a "paradise". See Chapter II.

[37] Letter, James H. Higman, Lieutenant Colonel, Corps of Engineers, Acting District Engineer to C. C. Rich, Contra Costa County Flood Control and Water Conservation District, October 23, 1970.

While the channels facilitated transportation in earlier times, they now hamper road transportation. State Highway 12 traverses the Delta in an east-west path, and State Highway 160 parallels the Sacramento River (See Fig. 2). The southern portion is crossed by State Highway 4. All roads in the Delta are built upon causeways or utilize existing levees and even though it is not indicated on the map, four-wheel-drive traffic is possible on the levees without roads. Approximately 8 ferrys scattered throughout the Delta connect many of the less traveled roads.[39] An enterprising grower replaced the State operated ferry to Medford Island with an impressive bridge, but the cost of insuring that bridge was formidable.

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[38] Discovery Bay, California, interview with Jim Graham, real estate salesman, March 25, 1972.

Of the 700 miles of waterways in the Delta, 550 are navigable and about 7,500,000 tons of cargo move through the Delta annually.[40] By straightening and deepening existing channels, Stockton has functioned as a deep water port since 1933. Its deep water channel is 30 feet deep and from 225 to 400 feet wide. A proposal to deepen the existing channel to 35 feet has been authorized but is now classified as inactive.[41] Sacramento has a similar deep water ship channel which begins in the Delta. As the map on page 12 illustrates, 25 miles of the Sacramento Deep Water Ship Channel was excavated[42] rather than using the Sacramento River, because it cuts off 15 miles and it is more economical to maintain (due to siltation) than a river channel.[43] At the Sacramento Terminal, the Channel is equipped with a 21 foot lift lock to facilitate barge traffic. Shallow water navigation is possible in the upper Sacramento River which has a channel depth of 6 feet to Colusa (85 miles from Sacramento) and 5 feet to Chico landing 50 miles from Colusa.[44]

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[39] DWR, Recreation, Plate 4.

[40] DWR, Multiple-Purpose Levee System, p. 1.

[41] United States Army Corps of Engineers (hereinafter cited as Corps of Engineers), Water Resources Development by the U. S. Army Corps of Engineers in California (January, 1969), p. 57.

The Atchison Topeka and Santa Fe Railroad crosses the Delta from Stockton to Antioch and a Southern Pacific line connects Rio Vista with Sacramento. Another Southern Pacific line circumnavigates the southern periphery of the Delta. The head clerk for the Santa Fe (50 years with the company) at Stockton was asked about the problems associated with the peat soils that the Antioch-Stockton line crosses. He said, "We poured carload after carload of rock into the bed till hell wouldn't have her." Pilings also were used extensively and the bed has now been stabilized.[45]

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[42] Corps of Engineers, Civil Works Project Maps (June, 1970, p. 2A.

[43] Report on Sacramento River, California bound as Senate Document No. 142, 79th Cong., 2d sess. (1946), p. 45.

[44] Corps of Engineers, Water Resources Development, p. 155.

[45] Stockton, California, interview with A. E. Kingston, Head Clerk, Santa Fe Railroad, March 20, 1972.

Since 1941, the Delta has produced about 300 million cubic feet of natural gas and it contains two of the most important dry gas fields in the state (dry gas is gas not associated structurally with oil production).[46] Wells are concentrated in the northwest but randomly scattered in the Delta.[47] Presently, daily production is almost 490,217 million cubic feet or almost half of the daily dry gas production in the state.[48]

Transmission lines cross the Delta in a north-south direction. Two 500 kilovolts lines, part of the Pacific Intertie, and two 230k.v. lines cross Sherman Island. Both systems are owned by Pacific Gas and Electric. Pacific Gas and Electric also has a substation on Grand Island which has two 115 k.v. lines on a northeast to southwest axis. The Bureau of Reclamation has four 230 k.v. lines which connect Shasta Dam and the Tracy substation. Two lines cross Sherman Island while two tie in from the east after passing through Sacramento and Stockton.[49]

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[46] DWR, Multiple-Purpose Levee System, p. 1. State Division of Mines, Department of Natural Resources, Geologic Formations and Economic Development of the Oil and Gas Fields of California, Bulletin Number 118 (1943), p. 33.

[47] State Department of Conservation, Division of Oil and Gas, Regional Wildcat Map: WG-1, November 14, 1970, Scale: 1" = 2 miles.

[48] State Department of Conservation, Division of Oil and Gas, "Monthly Oil and Gas Production Report," December, 1971, p. 19.

[49] BOR, Region 2: Interconnected Transmission Systems (n.d.), Scale: 1" = 30 miles.

CHAPTER II

RECLAMATION, INUNDATIONS, INCURSIONS

> In these reclaimable lands, we shall have a drought-proof means of life and luxurious living for the whole population of our State, were it twice as numerous. Heretofore, the certainty of occasional famine years has been a dark cloud on the horizon before the thoughtful vision. Now we see salvation. All hail to the great minds that have conceived this enterprise. God speed their success and bring them rich reward.
>
> Daily Alta California, 1869.

INTRODUCTION

The first section of this chapter identifies the historical setting of the Delta and the development of reclamation. Flood conditions and their occurrence in the historical and present period are discussed. Salinity incursions in the Delta before upstream diversions is reviewed and the incursions from 1920-1964 are illustrated.

Reclamation was very profitable in the early years. Originally about sea level in elevation the islands were reclaimed with low levees. Gates were opened at high tide to irrigate and low tide to drain. But with exposure to the atmosphere, the organic soils have oxidized and many of the islands are now five to twenty feet below

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sea level. Levees have to be built higher and stronger but the high spring tides, plus periods of prolonged winds and rains will still cause occasional flooding.

Similar to the oxidation and lowering of the islands, salinity incursions are something the reclamationists have had to learn to deal with. The first incursions occurred in 1917 and they intensified until 1934 brought relief with a return to natural hydrologic conditions. Since 1944 the potential incursions have been held in check by reservoir releases from the Central Valley Project Shasta Dam.

INDIANS, SPANIARDS AND TRAPPERS

For the Spaniards and the Argonauts, the Delta was a barrier to transportation and communications. It was difficult to cross and it harbored hostile Indians. The Indians and trappers, however, were in tune with the salutary nature of the environment.[50]

The Spaniards discovered the Delta in 1772 but more or less ignored it in the ensuing years. Jedediah Strong Smith, an American fur trapper wintered in the Delta (1827-28) and enjoyed a bountiful crop of beaver. Other trappers followed, but Smith's initial success was never duplicated. Moderate trapping activity continued until 1849.[51] To the Indians the Delta supplied prodigious yields of food and fiber. Elk, bear, antelope, salmon, water fowl and other wildlife were plentiful. The Delta at one time probably supported from 3,000 to 15,000 hunter-gatherers.[52] An epidemic (thought to be malaria), however, preceded all but the earliest white men and in the summer of 1830, 10,000 Indians in the Delta and approximately 10,000 more in the valley died.[53]

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[50] For an historical essay and contemporary photography treatment of the Delta, see: Dave Bohn and Roger Minich, Delta West: The Land and People of the Sacramento-San Joaquin Delta (Berkeley: Scrimshaw Press, 1969).

Explorers and early settlers were the recipients of this natural horn-of-plenty, and their diaries and accounts testify to its productivity. The following was recorded in November, 1824:

> An abundance of deer, large and small, are to be met with all over the country, and geese, ducks, and cranes, on the banks of rivers. There was such a superfluity of game, that even those among us who had never been sportsmen before, when once they took the gun in their hands, became as eager as the rest. The sailors chased the deer very successfully.[54]

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[51] Thompson, Settlement Geography, p. 88.

[52] William E. Schenck, "Historical Aboriginal Groups of the California Delta Region," University of California Publications in American Archives and Ethnology (Berkeley: 1926), V. 23, No. 2, p. 132.

[53] Sherburne F. Cook, "Epidemic of 1830-1833 in California and Oregon," University of California Publications in American Archives and Ethnology (Berkeley: 1955), V. 43, No. 3, p. 154.

[54] Otto VonKotzebue, A New Voyage Round the World in the Years 1823, 24, 25 and 26 (London: 1830), p. 143.

And in 1845:

> When passing down the Sacramento River, and crossing the bay of St. Francisco, I have frequently been greatly annoyed, by the almost deafening, tumultuous and confused noises, of the innumerable flocks, of geese and ducks, which were continually flying to and fro, and at times, blackening the very heavens with their increasing numbers, and making the aerial region ring, with their tumultuous croaking and vehement squeaking.[55]

RECLAMATION AND ASSOCIATED PROBLEMS

Reclamation was not easy. The Sacramento River was notorious for being unpredictable and unable to handle the floods that inundated parts or all of the delta. Alluviation, land subsidence, increasing seepage and later salt water incursion compounded the problems underlying agricultural use of the Delta lands. Also, peat does not compact well and natural levees were weak, the early farmers were unorganized and an island was only as safe as the weakest levee. Nevertheless, most of the islands were eventually reclaimed and re-reclaimed again after floods, as the negative factors were outweighed by the positive advantages of rich organic soils, an unlimited water supply and water transportation to the near-by markets. TableIII indicates the progress of reclamation by decades.

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[55] Lansford W. Hastings, The Emigrant's Guide to Oregon and California (Princeton: 1932), pp. 99-100.

TABLE III

RECLAMATION BY DECADE IN THE SACRAMENTO-SAN JOAQUIN DELTA

Decade	Acres Reclaimed	Accumulative Acres Reclaimed
1860 - 1870	15,000	15,000
1870 - 1880	92,000	107,000
1880 - 1890	70,000	177,000
1890 - 1900	58,000	235,000
1900 - 1910	88,600	323,600
1910 - 1920	94,000	417,600
1920 - 1930	24,000	441,600

Source: Department of Public Works, Variation and Control of Salinity in Sacramento-San Joaquin Delta and Upper San Francisco Bay, Bull. No. 27, 1931, Table 22.

Reclamation was started in earnest soon after the passage of the Arkansas or Swamp Land Act of September 28, 1850. The Act provided for a transfer of swamp and overflow lands, including those in the Delta, from Federal to State ownership. However, complications soon arose. The Federal survey parties surveyed during the dry season and they would not accept the surveys made by the State in the wet season. Also, "squatters" disputed among themselves over boundaries and they were reluctant to reclaim lands that may be taken away.[56]

The State was eager to acquire these Federal lands and put them into production. This was eventually done following extensive surveys. Governor John McDougal in an annual message to the 1852 Legislature pointed out that the land and climate were "peculiarly suited" for the "Chinese,...one of the most worthy classes of our newly adopted citizens..." He further perceived that the land would become, upon drainage, "...the most desirable land in the state...producing in the highest degree of perfection, rice, sugar cane and other staple products, which cannot be grown in other portions of the state."[57]

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[56] Thompson, Settlement Geography, p. 211.

After acquisition, the Legislature promptly set up the machinery for selling the swamp lands to private interests but little was done until 1868 and the repeal of a 640 acreage limitation attached to the original legislation.[58] Reclamation, to be effective, had to cover an entire island and this repeal brought in land speculators with the necessary capital. Within three years, almost all of California's swamp and overflow land was sold.[59] Speculation was rampant in this short period and graft plus corruption was widespread.[60]

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[57] Theodore H. Hittell, History of California (San Francisco: Pacific Press Publishing House and Occidental Publishing Co., 1885), Vol. 14, p. 84-85. Governor McDougal's geographic perception was not geographic reality. The Delta is one of the coolest areas in the valley and unsuitable for rice or sugar cane. Stockton has a summer mean of 73.4°; M. Y. Nuttonson, Environment and Agriculture of the Delta, p. 4. Red Bluff to the north has a July mean of 81.5°; Gleen T. Trewartha, An Introduction to Climate (New York: McGraw-Hill, 1954), p. 293. Buyers explains that the hot valley in summer creates a low pressure area to pull in the maritime breezes. The breezes, however, warm when they descend the Coastal Mountains due to the adiabatic principal and admixture. Maritime air that passes over the Delta comes straight through Carquinez Strait without heating; Horace R. Byers, "Summer Sea Fogs of the Central California Coast," University of California Publications in Geography (Berkeley: 1930), V. III, No. 5, p. 307. The frost free season in the Delta is only ten months. Thus, sugar cane is eliminated as it needs a frost free season for economic production; J. Carlyle Siltersen, Sugar Country (University of Kentucky: 1953), p. 52.

Reclamation proved to be very profitable. Soon after the 1868 repeal, the Tideland Reclamation Co. reclaimed Sherman Island. Reclamation cost $5 an acre and the price of land in one year went from $1.25 per acre before reclamation to $25 to $30 afterwards.[61]

To fully comprehend the high demand for reclaimed land, agricultural conditions in the state must be analyzed in the framework of the period. Early agriculturalists annually had to contend with droughts and floods. The state-wide mean of all weather stations (covering 59 years) for precipitation is 23.88 inches with a minimum of 11.56 inches and a maximum of 43.88 inches. The annual variation is three to one. Equally disastrous are wet and dry cycles. The seven years from 1927 to 1934 had a mean annual precipitation of 78 percent of the long-time mean, and the eight years 1904 to 1911 had a mean of 122 percent of the long-time mean.[62] State-wide droughts in 1856, 1862 and 1863-1865,[63] were the cause of much concern and the Delta with its unlimited water supply was considered mana from heaven! An 1869 editorial illustrates:

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[58] Harding, Water in California, p. 142.

[59] Statistical Report of the Surveyor General of California, for the Years 1869, 1870 and 1871, (Sacramento: 1872), pp. 6-7.

[60] Thompson, Settlement Geography, pp. 198-204. Harding, Water in California, p. 143.

[61] Daily Herald, July, 1869 cited in Tideland Reclamation Company, Fresh Water Tidelands of California (San Francisco: 1869), p. 21.

> In these reclaimable lands, we shall have a drought-proof means of life and luxurious living for the whole population of our State, were it twice as numerous. Heretofore, the certainty of occasional famine years has been a dark cloud on the horizon before the thoughtful vision. Now we see salvation. All hail to the great minds that have conceived this enterprise. God speed their success and bring them rich reward.[64]

In retrospect, this magnified statement was not too far out of perspective. The last flood of proportion had been in 1862, and it would be 1871 before another would occur and salinity intrusions were unknown of.

The early perception of floods was as keen as the observation which equated the Delta to the "...splendid sugar plantations of the lower Mississippi, and the rice fields of Georgia... "[65] as an overflow "...would not do more injury than the overflow of the Nile in Lower Egypt.[66]

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[62] Harding, Water in California, p. 11.

[63] Lantis, et. al., California, pp. 103, 346.

[64] Daily Alta California, July 25, 1869, cited in Tideland Reclamation Company, Tide Lands of California, p. 27.

Reclamation was in these early years considered a simple process: i. e. an engineer in a report states, "The expense of securing these lands (Twichell Island) against extraordinary inundation is not great."[67] Another engineer considering the same land stated, "...a levee of three feet above the natural surface will keep out the tides and ordinary floods."[68] Actually, during the low flow, or minor flood period, reclamation was very enticing. With three to five feet levees and thirty flumes, Sherman Island was not only reclaimed, but equipped for irrigation and drainage as well. Farmable land was at sea level and in order to irrigate it the operators opened the flumes at high tide; to drain, the flumes were opened at low tide.[69]

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[65] Tide Lands of California, p. 1.

[66] San Francisco Call, July 28, 1869, cited in Tideland Reclamation Company, Tide Lands of California, p. 35.

[67] Letter, B. S. Alexander, Lt. Col. of Engineers, Brevet Brig. Gen. U. S. A., to A. C. Peachy, Esq., President of Tideland Reclamation Company, September 18, 1869 reproduced by Tideland Reclamation Company, Tide Lands of California, p. 11.

[68] Letter, Sherman Day, Civil Engineer, to A. C. Peachy, Esq., President of Tideland Reclamation Company, September 10, 1869 reproduced by Tideland Reclamation Company, Tide Lands of California, p. 15. Emphasis original.

[69] Thompson, Settlement Georgraphy, p. 81.

Even with floods, these islands were above low tide and by repair of the levees they would drain themselves, leaving behind a "rich silt."[70] Browne provides a statement which summarized the early economic attractiveness of reclamation, "The high yield of wheat will offset the price of production, marketing and levee building in one year."[71]

Reclamation, however, produced associated problems that have continued to the present. Upon exposure to air, the organic soils began to oxidize and subside.[72] Fires, to break up the fibers, and the ever present wind[73] increased the subsidence rate to over three inches a year.[74] With subsidence, pumps had to be employed.

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[70] Tide Lands of California, p. 1.

[71] John Ross Browne, "Reclamation and Irrigation," California State Agricultural Society, Transactions of 1872 (Sacramento: 1874), p. 406.

[72] Some researchers contend the area has always subsided and reclamation has increased the rate. Others are of the opinion that subsidence is a result only of reclamation.

[73] Fire was once used extensively to break up the vegetation in the soil and to destroy nematodes and other pests in the peat soils; Division of Water Resources, Sacramento-San Joaquin Water Supervisors Report for Year 1931 (Sacramento, August, 1932), p. 206. Wind erosion may account for a removal of as much as 1/4 to 1/2 inches a year; Walter W. Weir, "Subsidence of Peat Lands of the Sacramento-San Joaquin Delta, California," Hilgardia, XX (June, 1950), p. 44.

[74] Nuttonson, Environment and Agriculture of the Delta, p. 29.

Although levees were built bigger and stronger, in 1878 a major flood on the Sacramento River in February and the San Joaquin in May created much destruction. Losses for the Delta approached $10,000,000. Over 2,500 acres of grain and 1,000 head of stock were lost in May alone.[79] The next section discusses the historical and present flood considerations in more detail.

INUNDATIONS

Highwater Hydrology

To fully comprehend the flooding problem in the Delta, it is necessary to examine the hydrology of the Sacramento and San Joaquin Rivers that contributes to the Delta floods. Snow is the major source of runoff in the Central Valley. The Sacramento River and its tributaries also receive a substantial amount of winter rain which may result in winter floods if the rain bearing storms are copious. Table IV illustrates the seasonal variation of runoff of three streams in the Valley. The Kings River, in the southernmost section of the Central Valley, drains into the Tulare Basin. Although its waters do not reach the Delta it approximates the seasonal runoff distribution of the San Joaquin River the head waters of which are in the same general area. Since the American

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[79] Ibid., p. 454.

TABLE IV

AVERAGE MONTHLY DISTRIBUTION OF AVERAGE SEASONAL RUNOFF FOR THREE CENTRAL VALLEY STREAMS*

	Sacramento River at Red Bluff		American River at Fair Oaks		Kings River[a] at Piedra	
Month	Monthly Runoff in Acre-feet	Percent in Seasonal Total	Monthly Runoff in Acre-feet	Percent in Seasonal Total	Monthly Runoff in Acre-feet	Percent in Seasonal Total
October	280,000	3.3	20,000	0.9	22,000	1.3
November	450,000	5.4	60,000	2.2	25,000	1.5
December	700,000	8.4	130,000	4.9	37,000	2.2
January	1,110,000	13.2	270,000	4.9	64,000	3.8
February	1,380,000	16.4	330,000	12.5	81,000	4.8
March	1,330,000	15.8	420,000	15.6	127,000	7.5
April	1,040,000	12.4	490,000	18.1	225,000	13.3
May	740,000	8.8	540,000	20.0	443,000	26.2
June	490,000	5.8	310,000	11.7	419,000	24.8
July	340,000	4.1	80,000	3.0	176,000	10.4
August	280,000	3.3	20,000	0.7	51,000	3.0
September	260,000	3.1	10,000	0.5	20,000	1.2
Totals	8,400,000	100.0	2,680,000	100.0	1,690,000	100.0

(a) This stream drains into the Tulare Basin. Thus, its waters do not reach the Delta. Nevertheless, it portrays the seasonal characteristics of the San Joaquin River.

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* From W.R.B., Water Resources of California, Bull. No. 1, p. 348.

River receives more rain, it has a higher percentage of winter runoff. The Kings, on the other hand, receives a higher percentage of snow which is held over until the spring and early summer. The headwaters of the Sacramento River drain a porous lava formation with a large underground storage capacity, therefore its flows are more evenly distributed.[80] Fig. 4 illustrates the seasonal variation of Delta outflow in an average water year under natural and present conditions.

The average annual natural flow into the Delta is 30.23 M. A. F. or 42 percent of the State's runoff. The Sacramento River contributes 22.39 M. A. F. while the San Joaquin contributes 6.39 M. A. F. and the Delta tributaries account for 1.54 M. A. F.[81] Average flows are significant for projecting the total amount of water potentially available for intra and inter-basin uses.[82]

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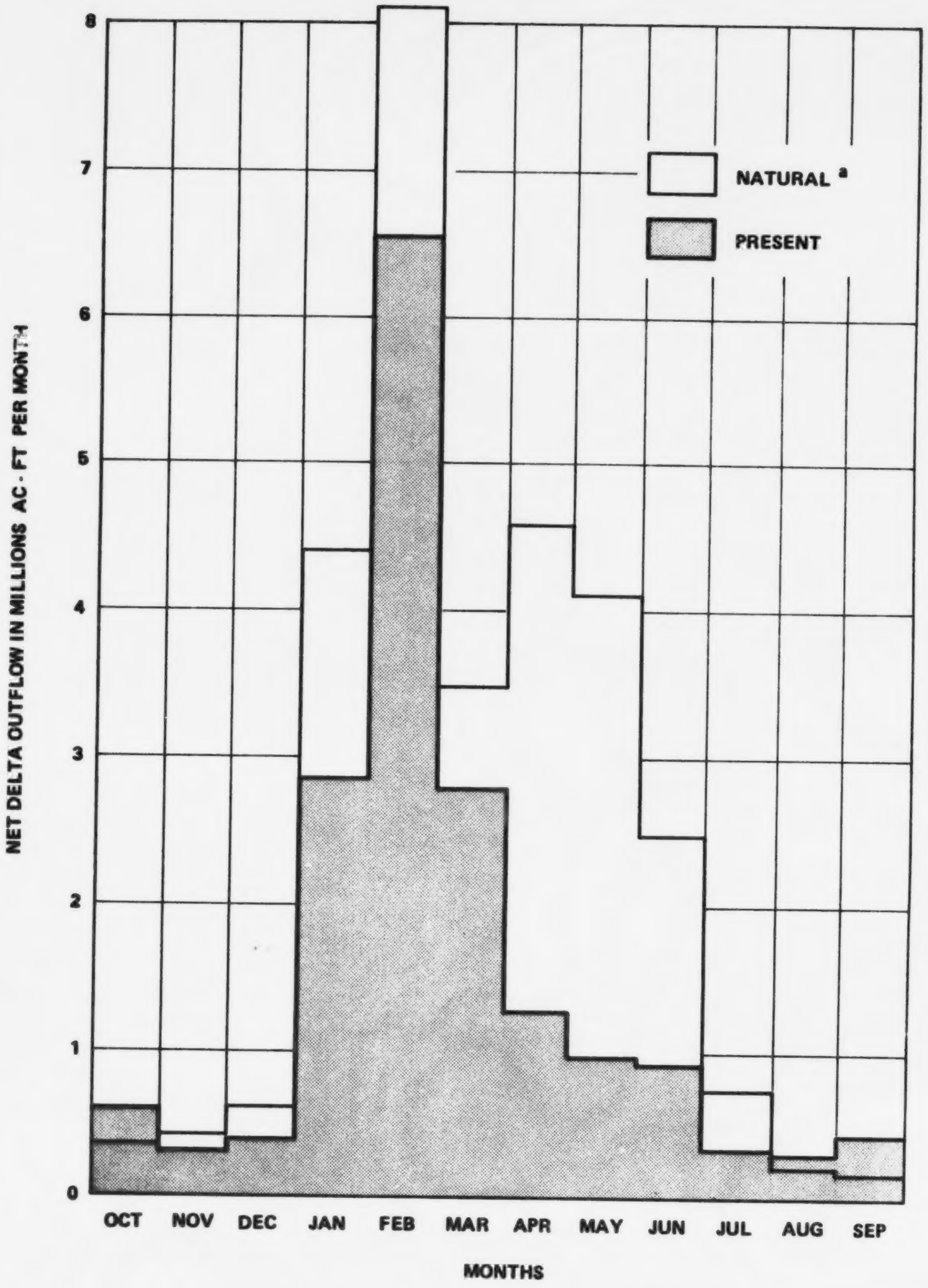
[80] W. R. B., Bull. 1, p. 346.

[81] _Supra_, N. 6.

[82] Seldom, however, is a stream controlled to such an extent the flows will be averaged. The scarcity of major floods makes them uneconomical for storage. That is, every foot added to the height of a dam will greatly increase its cost. And, if the dam could contain a one hundred year flood, much of it would be lost to evaporation the following one hundred years in which 1/100th of the flood would be released each year. And, as every student of natural phenomena knows, a major flood (100-year) may be followed the next year by a larger flood. Storage capacity for the Sacramento River Basin (22 M. A. F. runoff) is now 16 M. A. F.; State of California, Documents Section, _California Statistical Abstract: 1970_ (Sacramento, California: n. d.), p. 169. As

FIGURE 4. Estimated Natural and Present Delta Outflow in Normal Water Years.



SOURCE: KAISER ENGINEERS, SAN FRANCISCO BAY-DELTA WATER QUALITY CONTROL PROGRAM, FINAL REPORT TO THE STATE OF CALIFORNIA, JUNE, 1969; FIGURE VIII-5.

[a] BASED ON DWR ESTIMATE OF AVERAGE DELTA OUTFLOW DURING 1935-36 WATER YEAR.

Of equal importance is the seasonal and annual variation. As shown in Table IV, the streams of the Central Valley vary somewhat in their seasonal, natural discharge. Annually, the streams demonstrate a similar pattern. The maximum annual flow of 63.3 M. A. F. occurred in 1906-07, and the minimum annual flow of 9 M. A. F. occurred in 1923-24. This record minimum flow occurred at the beginning of a ten-year dry cycle which lasted until 1932-33. Runoff during each of the years, except 1926-27, was less than average and the average for the ten years was only 66.3 percent of the long-time average.[83] Figure 5 illustrates the great amount of annual variation for the Red Bluff Station on the upper Sacramento River.

Teamed with the great variation in stream flow is the inability of the Sacramento channel to transport the flows. Below the Feather

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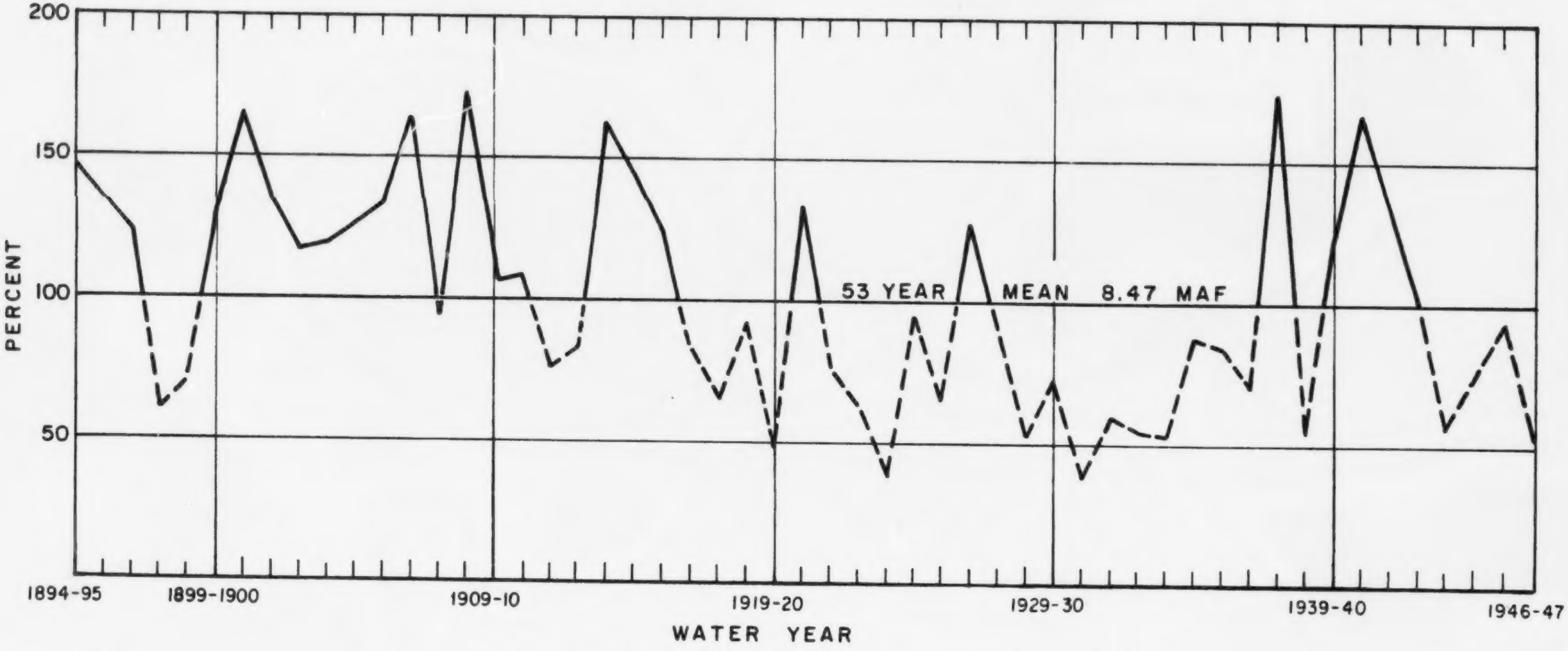
comparison, storage capacity for the average annual flow of 16 M. A. F. on the Colorado is over 59 M. A. F. ; Johannes Humlum, Water Development and Water Manning in the Southwestern United States (Kulturgeografische Institut, Aarhus Universitaet: 1969), p. 240. Thus the 16 M. A. F. storage capacity does not begin to completely regulate the streams of the Sacramento Basin in all but the dryest years. It must be pointed out, also, that not all of the 16 M. A. F. is available. That is, Oroville Reservoir with 3.5 M. A. F. of storage has only 2.0 M. A. F. of active storage. The remainder, 1.5 M. A. F., is inactive or dead storage as it is below the operating outlet for the reservoir. Similarly, Shasta Reservoir has .6 M. A. F. of dead storage and 3.9 M. A. F. of active storage. For a more detailed discussion, see Hall and Dracup, Water Resources System Engineering (New York: McGraw-Hill Book Company, 1970), p. 162-198. Also see Table 6.

[83] W. R. B., Bull. 1, p. 346.

FIGURE 5

ANNUAL PERCENT VARIATION OF SACRAMENTO RIVER AT RED BLUFF



Computed from:

State Water Resource Board Water Resources of California, Bull. No. 1, p. 408.

River mouth the Sacramento channel capacity (before artificial levees and upstream reservoirs) was one-seventh of the estimated flood flows.[84] Downstream from Sacramento, the channel capacity was 110,000 cfs (cubic feet per second) while the discharge had been as great as 660,000 second-feet (pre-1916).[85] An account in the "Marysville Appeal" testifies to the extent of an early 1862 flood:

> ...westward one vast water level stretching to Yuba City...the entire townsite being under water. Beyond this to the foothills..there appeared to be no dry land.[86]

Since the San Joaquin River has a smaller flow, its notoriety for floods does not approach that of the Sacramento. Also, it is fed predominantly by snow melt rather than rain. Nevertheless, annual flows vary greatly and it should not be dismissed due to the lower average annual flow. Rich stated (in 1950) that in the past 40 years a total of 42 damaging winter rain floods had occurred in the Sacramento Valley but no damaging snow-melt floods. In the San Joaquin Valley 15 damaging winter rain floods and 6 damaging snow-melt floods had occurred in those years.[87]

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[84] C. E. Grunsky, "The Relief Outlets and By-Passes of the Sacramento Valley Flood-Control Project," American Society of Civil Engineers, Transactions, XC III (January, 1929), p. 798.

[85] Second-feet is the abbreviated term for cubic feet per second. One second-foot is one cubic foot of water passing a given point in one second with a velocity of one foot per second. A flow of one second-foot for 24 hours equals 2 acre feet. See N. 6 Supra. V. S. McClatchy, "Flood Control and Reclamation in California," paper presented at annual meeting of National Drainage Congress, Cairo, Illinois (January 20, 1916), p. 5.

[86] Joseph A. McGowan, History of the Sacramento Valley (New York: Lewis Historical Publishing Company, 1961), V. I, p. 184.

Floods

In the Delta a complex relationship between stream discharge, tides, wind, precipitation and instability of levees combine to produce inundations. Table V illustrates the disproportionate relationship between discharge (Column d) and the elevation of high water at Venice Island, the more centrally located station. In 1938, the discharge was 300,000 c. f. s. and the corresponding elevation was 10.2 above lower low water (see note b). In 1907, the stream discharge was twice as great, yet the high water mark was the same. And in two years (1914 and 1942), the discharge was greater than the 300,000 c. f. s. discharge but the high water mark was lower. From the aforementioned evidence, it may be deduced that maximum flooding conditions occur when an unusually high discharge is accompanied by an equally unusual high tide and a high wind which may raise the water level an additional 0.7 foot.

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[87] H. M. Rich, "Comprehensive Survey Report of the District Engineer," Sacramento-San Joaquin Basin Streams, California, U. S. House. 81st Cong., 1st sess., H. D. 367 (1950), p. 106.

TABLE V

FLOOD CONDITIONS*

Day of High Bay Tide(a)	Elevation of High Water in Feet			Maximum Delta Inflow Total cfs(d)
	San Francisco Bay at Presidio(b)	Sacramento R. Rio Vista(c)	San Joaquin R. Venice Island(c)	
Mar. 23, 1907	6.0	10.0(e)	10.2(f)	600,000
Jan. 21, 1909	7.6		(g)	550,000
Jan. 25, 1914	7.5		9.6(f)	350,000
Nov. 18, 1918	8.2		(g)	10,000
Feb. 11, 1938	7.5	9.5	10.2	300,000
Jan. 5, 1939	7.7	7.5	7.7	10,000
Feb. 28, 1940	7.6	9.1	(g)	360,000
Dec. 24, 1940	8.4	9.4	9.5	210,000
Feb. 7, 1942	6.2	8.6	8.7	370,000
Dec. 21, 1945	7.8	8.2	8.4	20,000
Jan. 25, 1948	7.8	7.8	8.0	10,000
May 31, 1950	7.6	8.8	9.2	50,000
Dec. 8, 1950	7.8	9.1	9.8	290,000

(a) Highest Delta station stages and inflow are not necessarily concurrent with the day of highest San Francisco tide.

(b) 5.5 feet have been subtracted to make the elevations reflect a height above lower low water which is normally the Corps of Engineers elevation datum plane.

(c) Corps of Engineers datum. Feet above lower low water.

(d) Rough estimate of maximum total inflow during flood or high tide period.

(e) Estimated for present levee and channel conditions by personnel of State of California.

(f) Observed near Venice Island corrected to Corps of Engineers datum by application of 3.6 feet to readings given to Geological Survey datum.

(g) No record.

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* Corps of Engineers, Survey Report for Flood Control and Allied Purposes: Sacramento-San Joaquin River Delta, California, Appendix A - Hydrology, December, 1953, p. 13.

Reservoirs reduce the full effect of floods but have not eliminated inundations in the Delta. The Sacramento River from Chico Landing to its mouth and the major tributaries downstream have levees which act to pass the floods downstream to the Delta.[88] This may offset the beneficial effect of the reservoirs in the downstream areas. Table VI illustrates the accumulated acre feet of storage per decade on the Sacramento River.

A mere presentation of the figures is insufficient to understand the full potential of the 16 M. A. F. in regulating the 22 M. A. F. of average annual discharge. It has been estimated that only 25 to 30 percent of the total Central Valley storage capacity is replaced annually.[89]

Early reservoirs built by irrigation districts tended to be small with little annual carry over capacity from year to year.[90] They were mostly used for taking the tops off winter floods and

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[88] Corps of Engineers, Water Resources Development in California, p. 127.

[89] Department of Water Resources, personal communication, to John E. Skinner in Department of Fish and Game, Ecological Studies of the Sacramento-San Joaquin Estuary, ed. by John E. Skinner, June, 1972.

[90] Joe S. Bain, Richard E. Caves and Julius Margolis, Northern California's Water Industry: The Comparative Efficiency of Public Enterprise in Developing a Scarce Natural Resource (Baltimore: The Johns Hopkins Press, 1966), p. 242.

TABLE VI

ACCUMULATED STORAGE IN THE SACRAMENTO RIVER BASIN*

	Acre-feet by Decade	Accumulated (Acre-feet)
1850	0	0
1850 - 1860	14,100	14,100
1860 - 1870	7,000	21,000
1870 - 1880	5,200	26,300
1880 - 1890	0	26,300
1890 - 1900	1,200	27,500
1900 - 1910	47,900	75,400
1910 - 1920	600,200	675,600
1920 - 1930	2,011,600	2,687,200
1930 - 1940	37,800	2,725,000
1940 - 1950	4,654,700	7,379,700
1950 - 1960	2,671,300	10,051,000
1960 - 1966	5,436,200	15,487,200[a]

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* Gerald H. Jones, "Alteration of Sacramento River," p.34.

[a] This figure is now out of date. Counting the reservoirs under construction in 1970, another researcher reports 15,920,000 acre-feet of gross storage with 12,920,000 acre-feet active. The Delta Central Sierra is listed as 1,240,000 acre-feet gross, 1,200,000 active, while the San Joaquin Basin is reported as 5,850,000 acre-feet gross and 5,460,000 acre-feet active. Federal Water Pollution Control Administration, Central Valley Water Resource Study, March, 1970, p. 20.

distributing the water in the growing season. Similarly, single purpose hydroelectric units constructed by the power companies are smaller than the large multi-purpose project reservoirs.

Table VII lists the inundations for each tract. When the years of inundations are compared to the years of flood flows and high water in Table V, it is realized that other factors are responsible for levee failures.

For example, in December, 1955 a peak outflow of 450,000 c.f.s. was recorded in the Delta but the high water level had occurred a week earlier during spring tide.[91] When the orbits of the moon around the earth and the earth around the sun bring all three bodies roughly into line, the tidal changes are much larger than usual. These spring tides occur twice a month, when the moon is full and when it is new. The effect can be further accentuated when the lunar path of the moon brings it close to the earth and the earth's path brings it close to the sun. Such celestial conditions, however, are rare.[92] Another significant factor is the length of time the high water persists, as opposed to the actual water height. Most inundations, in fact, are due to levee failures resulting from persistent pressure--rather than over topping. When considering

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[91] Delta Water Users Association, Delta Water News, March 1965.

[92] Time, "Danger from the Tides," January 7, 1974, p. 55.

TABLE VII

INUNDATIONS BY TRACT

Tract and Size	Date Flooded	Production Time Lost
Andrus (3,448)	1890	
	1907	1 year
	1972	1 year
Bacon (5,625)		
Bethel (3,404)	August, 1926	Failure due to carelessness in installation of irrigation box
Boggs (2,046)	1911	3 years
Brack		
Bradford (2,159)	1906	2 months
Brannan (7,263)	1972	1 year
Bouldin (6,006)	1906	
Clifton Court (3,363)	1907	2 years
Empire (3,708)	1961	
Franks	1936	10 months
	1938	Never reclaimed
Holland (4,294)		
Little Holland (3,000)		
Jersey (3,558)	Several 1900-1909	2 years
King (3,260)		
Liberty Island (2,100)	1972	
	1974	
Mandeville (5,438)	1938	4 months
McDonald (6,142)		
Medford (1,260)	1936	Unknown
Mildred (1,238)		
Prospect Island (2,300)		
Palm (2,465)		
Quimby	1936	1 year
	1938	1 year
	1961	
Rhode	1938	
Rindge (6,837)		

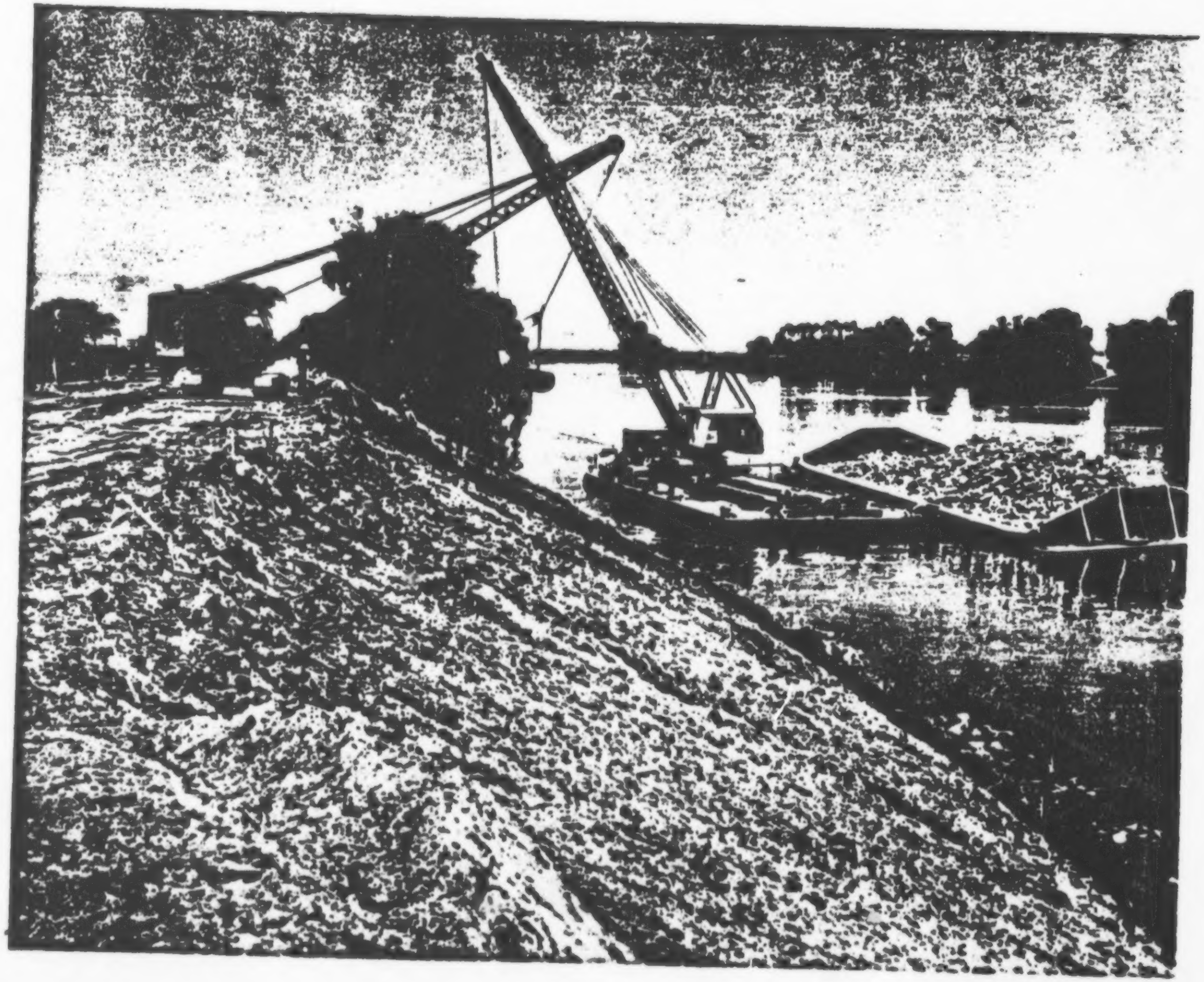

FIGURE 6. Levee repairs by Army Corps of Engineers at Merritt Island on the Sacramento River. Most Delta levees do not have rip-rap (rocks) to protect them from wave action. (Photo courtesy of U.S. Army Corps of Engineers, Sacramento Division.)

TABLE VII--Continued

Tract and Size	Date Flooded	Production Time Lost
Roberts (Lower)	1905 (approximately)	Very short
Sherman (10,305)	1878	19 years
	1900	1 year
	1905	1 year
	1909	1 year
	1969	1 year
Staten		
Twitchell (3,630)		
Tyler		
Venice (3,844)	1932	
	1938	
	1950	
Webb (5,523)	1950	
Wright		
McCormic-Williamson (17,600)	1955	
	1964	
New Hope	1964	

Source: Corps of Engineers, "Sacramento-San Joaquin Delta Levee Failures," (December 5, 1944) subsequently updated. Unfortunately there is some disagreement between researchers in regard to floods. The Corps of Engineers' study is cited because of the historically strong nexus it has with floods. Thompson ("Settlement Geography," p. 500), however, presents convincing evidence that Bethel Island went under in 1907, 1908 and 1911. The Corps indicates Bethel Island was flooded in 1926 only. Discrepancies continue. The D.W.R. (Economic Aspects, Appendix to Bulletin No. 76, Delta Water Facilities, December, 1961, p. 35) published Table 16, Historical Inundations In the Delta, footnoted with the statement, "Inundations occurring in the Yolo Bypass are not included in this table." Yet the table portrays 11,200 acres flooded in 1958 and the only records found of inundations in 1958 were Little Holland, Liberty Island and Prospect Island--all in the Bypass. The Bypass, completed in 1924, carries flood flows of the Sacramento River from above Sacramento to Cache Slough. The heights of these levees are controlled by court order and they are expected to be inundated with major flood flows and high tides; U.S. Army Corps of Engineers, Report on Floods of February-June, 1958: Sacramento-San Joaquin-Tulare Lake Basins California, Appendix A, Detailed Supporting Data, (November, 1958), p. 8. Reluctantly, the usual limitations of time and resources do not allow a complete investigation into this problem.

TABLE VIII

INUNDATED OR INADEQUATELY RECLAIMED TRACTS*

Name of Tract	Date Inundated(a)	Area	
		Gross Acres	Inundated Acres(b)
Browns	(c)	700	0
Donlon	1937	230	160
Dutch Slough	1927	2,200	1,600
South Fern, Headreach and Tule	(c)	220	0
Franks	1938	3,100	3,000
Kimball	(c)	150	0
Lower Sherman	1925	3,300	1,800
Tule Island, South of Quimbly	(c)	400	0
Venice Point	(c)	210	180
West	(c)	200	20
Winter	(c)	600	0

(a) Time when last levee failure occurred or approximate time when former levees were abandoned.

(b) Area formerly protected and now flooded with normal mean tide. Practically the entire gross area is flooded at extreme high tide.

(c) Never fully reclaimed or cultivated.

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* U.S. Army Corps of Engineers, "Survey Report for Flood Control, Recreation, and Allied Purposes, Sacramento-San Joaquin Delta," p. 22.

the flood control effects of the Central Valley Project in the Delta, the D. W. R. stated, "Its flood control facilities, moreover, are found to offer less than optimum protection for the Delta. Levee failures continue to occur somewhere in the delta whenever the surface elevation of the channels exceed 4 feet above mean sea level for more than 48 hours."[93]

In addition to the Islands re-reclaimed, some islands are still inundated or inadequately reclaimed as Table VIII indicates. Several reasons are responsible for their inundated state. The western islands were abandoned due to salinity incursion. A development tract was left inundated due to financial collapse of the corporation. Others are too small to be viable economic units.

Approximately 15 percent of the levees in the Delta were constructed or rebuilt by the U. S. Army Corps of Engineers to withstand the largest flood on record (1906-07) since 1850. [94]

Fig. 6 illustrates a project levee. The floating clamshell is placing rip-rap on the levee to reduce erosion . Because it is an expensive project, many of the growers do not rip-rap their levees. Due to the conflict between recreationist and growers plus the state's interest in preventing inundations the Department of Water Resources (DWR) has prepared a plan in which the state would assume responsibility for maintenance of some levees in exchange for recreation access.[95] In coordination with this study DWR has also outlined four alternatives for the Delta levees.[96] Ranging from no improvement at no cost to extensive improvement at a cost of $192 million, the recommended plan is yet to be released. In the meantime, the Legislature has authorized $400,000 to subsidize levee maintenance for the levees built to the state Reclamation Board's levee standards.[97] This latter action was triggered by the Andrus Island flood of 1972 which is discussed below.

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[93] Division of Water Resources (hereinafter referred to as Div. W. R.), Report to the Water Project Authority of the State of California on Feasibility of Construction by the State of Barriers in San Francisco Bay System (March, 1955) p. 26. The Corps of Engineers use a base 3. 6 below mean sea level (see note f, Table VI). Thus 4. 0 M. S. L. is equal to 7. 6 in Table VI.

[94] Corps of Engineers, "Survey Report for Flood Control," p. 3.

Accounts of the most recent winter and summer levee failures in the Delta summarizes the present status of floods and flood control. Sherman Island went under in January, 1969 and Andrus Island in June, 1972.

Approximately 10,000 acres in size, Sherman Island had withstood water heights of 7 feet above mean sea level on several occasions. The failure occurred, however, on January 20, 1969 with a water level only 5.5 feet above mean sea level.[98] Several days of rain and wind preceded the break. The rain weakened the levees and wind enduced waves pounded at an unknown weak spot until it gave way to develop into a 200 foot opening. The 200 or so residents began to evacuate the island and the Red Cross spent over $36,682 for disaster relief.[99] The growers petitioned the U. S. Army Corps of Engineers for emergency help for closing the break. Time was of the essence as the levees were weak and the waves were eroding the levees from the inside. Four days after the break, the District Engineer for the Corps requested emergency funds from the Division Engineer. The estimated cost of reclamation was:

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[95] Supra N. 28, 31.

[96] Supra N. 33.

[97] Antioch Ledger, November 17, 1973, p. 1.

[98] Letter, Colonel George B. Fink, District Engineer of the U. S. Army Corps of Engineers to the Division Engineer, U. S. Army Corps of Engineers, January 24, 1969.

1.	dewatering island	$ 200,000
2.	restoring damaged levee	400,000
3.	restoring lands and buildings	850,000
4.	restoring private utilities	300,000
5.	restoring public utilities	200,000
6.	restoring State Highway 160	50,000
7.	repairing levee break	600,000
		$ 2,600,000

The expense was justified as the market value of the reclaimed island is $8,000,000. The Corps further stated the requirements of the local interest. They were:

1. furnish all right-of-way.
2. release the U. S. from damage claims.
3. unwater the island and restore the remainder of the levee system to preflood conditions.

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[99] Sacramento Bee, February 22, 1969, p. B-1.

4. pay 12.5 percent of the cost.
5. agree to maintain the levee system in accordance with rules and regulations.[100]

All parties agreed and the Corps began the task of closing the levee. A large clamshell was anchored at the break and it began the filling process. Bottom dump barges dropped tons of rock to slow the surge of water. A simultaneous effort was required before the gap was sealed and several of the barges poured 1,400 tons of rock into the break in five minutes. After two weeks and 20,000 tons of rock plus 350,000 cubic yards of sand, the break was sealed.[101]

The problem was far from solved. The 10,000 acres island was under 15 to 20 feet of water. Extra pumps were brought in and a total of ten pumps worked around the clock to take the water level down one inch a day. The slow rate of dewatering was due to the great amount of water and the necessity of slowly drying the levees. To dewater too fast would result in saturated weak levees.[102] Five months after the break, the water was three feet deep in the center of the island and only 1,000 acres were sufficiently dry to cultivate.[103] It was some time before the land was releveled and production was equal to the pre-inundation period.

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[100] Letter, Colonel Fink to Division Engineer.

[101] Sacramento Bee, February 10, 1969, p. A-3.

[102] Sacramento Bee, March 1, 1969, p. B-1.

[103] Sacramento Bee, June 19, 1969, p. B-2.

Between the time the Sherman Island flood was described and this thesis was completed, a major flood occurred on Andrus and Brannan islands. The previous description of the Sherman Island flood is left intact, as it portrays the vulnerability of the levees in their weak winter period. In the absence of massive rebuilding programs, the vulnerability will increase because of the continuing subsidence. The Andrus-Brannan islands flood is unique for two reasons: it occurred in the summer, and it illustrates the vulnerability of not only the Delta islands, but also of the projects that use the Delta for water exportation.

On the longest day (June 21) of a dry water year (1972) at 1:00 a. m., a Delta levee, with a crest of 30 feet and 6 feet of freeboard, gave way.[104] The break occurred near high tide, but the tide was higher the day before. Maintenance crews had worked on the levee five days prior to the failure, but the break was unexplainable.

Within minutes, the opening enlarged to 300 feet and water poured down into Andrus Island, some 20 feet below sea level. Two days later, the water level equalized, and the levees of Andrus and adjoining Brannan Island surrounded a lake containing 150,000 acre-feet of water. The water rushed to the low center of the island, and then it worked out in a somewhat radial pattern. The topography gave the town of Isleton (population 1,200) a small amount of time to prepare. Isleton is located on the crest and inside flank of a levee protecting the island from the Sacramento River. At 9:00 a.m. the state office of Emergency Preparedness called upon the Army Corps of Engineers for help. Within an hour, the poised Corps marshalled dump trucks, earth moving equipment, and sandbaggers to build an emergency mile and one-half long levee around Isleton. The levee held back a 5-foot tide at 3:00 p.m. and,at 2:30 a.m. the next day,a 7-foot tide--the highest in several days. The waters continued to pour into the island and at 9:45 p.m. Isleton's respite ended. The State Office of Emergency Services concluded "There's nothing we can do now but wait and see what the water does."[105] Most of the town and 12,000 acres of crops were inundated.

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[104] Sources of information for this section are listed in footnote 106.

On the same day that the waters equalized, reclamation began. Sixty thousand tons of rock, 500,000 cubic yards of sand and 33 days later, the levee break was sealed. Discharging 500,000 gallons per minute, 17 pumps dewatered the island with a water level drop of one and a half inches per day. On September 26, the residents of Isleton were allowed to return; by the end of the year, half still remained away.

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[105] As reported in The Sacramento Union, June 23, 1973, p. 1.

Damages were estimated at $2 million in crop loss, $2.8 million to residences, and $.9 million to rebuild the levee. Some 33 plaintiffs filed $51 million in claims against Sacramento County, the State, Stockton Port District, and the Brannan-Andrus Levee Maintenance District. Attorney Melvin Belli estimated the claims would reach $500 million.[106]

While the Andrus Island flood was as damaging to the Island's inhabitants in the summer as it would have been in the winter, the fact that it occurred in the summer focuses attention on the vulnerability of the present project export system to this summer occurrence. Delta island inundations in the winter are usually preceded and accompanied by large flood flows that have the saline bay waters pushed well out of the Delta. There is sufficient natural inflow to fill the void created by the flooding island and to repel the incursion simultaneously. Furthermore, if necessary, the projects can withstand longer periods of shutdown during the winter, low demand period. When the summer flood occurred, the projects immediately upped the outflows from 4,500 c.f.s. to 12,000 c.f.s., releasing 300,000 acre-feet in ten days; 200,000 from CVP reservoirs and 100,000 from Oroville. While these measures aided in repelling the salt water sucked in the Delta to fill the two islands, they were inadequate. The state stopped their Delta pumps for 29 days and the Bureau's Tracy pumps (supplying the Delta-Mendota Canal), with less stringent water quality requirements, were cut back for 13 days. Water from the Mokelumne Aqueduct was diverted into the CVP Contra Costa Canal. By August 16, salinity conditions were back to pre-flood levels.[107]

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[106] Information on the flood was taken from DWR, The California State Water Project in 1973, Bull. No. 132-73, p. 42 and the following newspapers: The Sacramento Bee, June 21, 1972, pp. A1, A4, A5; June 22, 1972, pp. A1, A4, B1, B2, B3; June 23, 1972, pp. A1, A12, B1; June 24, 1972, pp. A1, A6, A8; July 2, 1972, p. A1; August 28, 1972, p. B3; September 27, 1972, p. B3; November 24, 1972, p. C1; December 20, 1972, p. A3; The Sacramento Union, June 22, 1972, pp. A1, A2; June 23, 1972, pp. A1, A3; August 31, 1972, p. C5; Oakland Tribune, July 11, 1972, p. 17; July 25, 1972, pp. 1, 3; San Francisco Chronicle, June 22, 1972, pp. 1, 2, 3, 24; June 28, 1972, p. 5; San Francisco Examiner, July 24, 1972, p. 4; San Francisco Sunday Examiner and Chronicle, June 25, 1972, pp. A12, A13, A14.

It takes little imagination to realize the crippling effect of a summer failure upon the projects towards the end of the season, several years in the future, after a few dry water years. Storage reserves would be at a minimum or non-existent; and delivery schedules would probably require continuous pumping. In short, the projects might temporarily go dry. This was brought out by the author (Sen. Howard Way) of the bill that provides state funds to subsidize levee maintenance.[108] It also explains DWR Director Terrink's strong support of state financing for improved Delta levees.[109]

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[107] DWR, Bull. No. 132-73, p. 42; The Sacramento Bee, July 2, 1972, p. A1; San Francisco Chronicle, July 3, 1972, pp. 1, 14; Oakland Tribune, August 11, 1972, p. 8; August 31, 1972, p. 3.

[108] See text accompanying N. 95 Supra.

SALINITY INCURSIONS

Enumerated at the beginning of this chapter is an historical account of early reclamation in the Delta. Reclamationists were unprepared for the floods the Sacramento and San Joaquin Rivers would deliver to the Delta. The instability of the peat levees and the subsidence of the area were other problems that also developed with reclamation. Yet another problem facing reclamationists was that of salinity incursion. A series of years with unprecedented low precipitation and runoff, coupled to an increase in stream diversions upstream resulted in a record low stream flow into the Delta. With the reduction of stream flow there was less resistence to the saline tides that flow into the Delta. Thus, to the list of problems, the growers added salinity incursion.

Salinity in General

Since irrigation is the historical water use in the Delta, agricultural water quality degradation provides a convenient measuring stick in determining the extent of the annual incursion. Before the extent of the degradation/incursion can be presented , water quality standards must be identified.

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[109] The Sacramento Bee, November 30, 1973, p. B2.

Water quality standards for irrigation are difficult to establish. Crops vary in their salt tolerance, and tolerances also vary with different stages of growth or germination of the same crop. Climate may modify the responses of plants to salinity, and other variables include the frequency and method of irrigation, drainage, and the type of soil.[110] Table IX summarizes the classifications of irrigation waters.

TABLE IX
SUMMARY OF CLASSIFICATIONS OF IRRIGATION WATERS

Class	EC x 10^6 at 25° C. Specific Conductivity (Concentration of Ions)	Total Salts in mg/l
I	Earlier papers suggested limit of 500, but more recently 1,000 has been accepted.	Up to about 700
II	500-3,000	350-2,100
III	More than 2,500-3,000	More than 1,750-2,100

Class I - Excellent to good, or suitable for most plants under most conditions.
Class II- Good to injurious, harmful to some under certain conditions of soil, climate, practices.
Class III-Injurious to unsatisfactory, unsuitable under most conditions.

Source: State Water Resources Control Board, Water Quality Criteria by Jack Edward McKee and Harold W. Wolf, 1963, p. 109.

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[110] U. S. Department of Agriculture, U. S. Salinity Laboratory Staff, Saline and Alkali Soils, Agriculture Handbook No. 60, February, 1954, pp. 69-72.

In the Delta, water containing less than 1,000 ppm is permissible for irrigation use under average conditions. Water containing between 1,000 and 2,000 ppm may be used with caution, while that containing more than 2,000 ppm is considered unsafe.[111]

Salinity Incursions before Diversions

The transition zone from saline ocean water to fresh water in the Bay-Delta Estuary is difficult to delineate. The daily cycle of the tides and the variation in the tidal prisms from day to day, plus the variation of the stream discharge, all combine to keep the transition zone in constant movement. During periods of miniscule discharge from the Sacramento and San Joaquin Rivers, usually in the summer and fall, the saline waters migrate into the Delta, but in heavy discharge periods, usually winter and spring, the entire estuary system may be void of saline waters. One account states that for two weeks after the 1862 flood, fresh water fish were caught outside the Golden Gate.[112]

Salinity incursion, therefore, is a low discharge or summer phenomenon; yet, the winter discharge is related to the extent of the low flow, salinity incursion. Floods push the saline waters oceanward and the salinity incursion begins as the floods begin to taper. In years in which subnormal discharges occur, saline waters remain in San Pablo Bay and the subnormal low flow period (summer) begins with a deeper saline incursion. Thus, salinity incursion occurs earlier, due to the low winter discharge, and migrates further into the Delta. Consideration of the winter floods-salinity relationship is valid but it should not discredit the statement that "... salinity invasion in the delta is governed mostly by summer flow..."[113]

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[111] State Water Rights Board, Decision D990, February 9, 1961, p. 44.

[112] McGowan, History of the Sacramento Valley, p. 242.

The first account of saline conditions is recorded in a report of a Spanish expedition in the packet San Carlos in the summer of 1775. Exploring the San Francisco Bay, the San Carlos sailed into Suisun Bay where the pilot recorded, it has a "... depth of 13 brazos, diminishing to four where some rivers empty and take the saltiness of the water which then becomes sweet, the same as in a lake. The rivers come, one from the east-northeast (this is the largest about 250 yards wide), the other, which has many branches, comes from the northeast through tulares and swamps in very low land."[114] There is some question as to the exact place where fresh water was encountered. A map accompanying the report indicated fresh-water was encountered midway between the lower end of Suisun Bay and the confluence of the Sacramento and San Joaquin Rivers.[115]

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[113] Div. W. R., Variation and Control of Salinity in Sacramento-San Joaquin Delta and Upper San Francisco Bay, Bulletin No. 27 (hereinafter cited as Bull. No. 27), p. 150.

[114] Zoeth S. Eldridge and E. J. Molera, "The March of Portola and the Log of the San Carlos," The California Promotion Committee, San Francisco, 1909, cited by Div. W. R., Bull. No. 27, p. 47.

The second historical account is more informative. In 1841, a Commander Ringgold sailed into San Francisco Bay. Casting anchor at San Francisco, Commander Ringgold relates the difficulties encountered in securing water as there had been a "... drought that had prevailed for several months."[116] Thus the fresh-water flow into the Delta in the summer of 1841 was probably below normal and the Commander sailed three miles into the Delta before fresh-water was encountered.

Continuous observations were made by the early residents of Antioch in the 1860's and 70's. Antioch is located in the western Delta on the San Joaquin River four miles from its mouth. In a 1920 court case, some of the residents testified that the water offshore "...became brackish or salty and unfit for domestic consumption during a part of the late summer or early fall months of most years and certainly during dry years, as far back as the sixties and seventies,"[118] but "... other witnesses, of course, testified the water was suitable for irrigation at all times."[119]

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[115] Div. W. R., Bull. No. 27, p. 46.

[116] Charles Wilkes, U. S. N., U. S. Exploring Expedition 1845, Chapter 5 of Vol. V, cited by Div. W. R., Bull. No. 27, p. 47.

In 1905, the California and Hawaiian Sugar Refining Corporation located a sugar refinery on the south shore of Suisun Bay in the town of Crockett. A very pure quality of water is required for sugar refining purposes as it must not exceed five parts of chlorine per 100,000 parts of water. To acquire this water the refinery had specially constructed water barges towed upstream until fresh-water was found. Occasionally water was taken offshore, but usually, two trips a day were made to the Delta, going up on the high tide and returning on the ebb tide. Accurate measurements of the distances traveled were recorded. They varied from month to month in the same year, and in the same month of different years.[120] This, of course, is primarily caused by the seasonal and annual variation in stream discharge.

From these observations, the State Division of Water Resources concluded (p. 161), in its monumental work on salinity incursion, Variation and Control of Salinity:

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[118] Ibid., p. 47.

[119] Harvey O. Banks, DWR Director, testimony before the California Senate Interim Committee on Proposed Water Projects. January 22, 1958.

[120] Div. W. R., Bull. No. 27, p. 48.

The historical information previously presented in Chapter II as to salinity conditions, including data as far back as 1775, again in 1841 and also in the sixties and seventies, shows that the invasion of saline water into the delta, under natural conditions before reclamation, extended only a short distance above the confluence of the Sacramento and San Joaquin rivers even in dry years.[121]

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[121] *Ibid.*, p. 161. In two respects, Bull. No. 27 is the old testament of salinity incursion. First, it is considered the authoritive work on salinity incursion before reclamation as the research is used by several state, federal and independent works;(Div. of W. R., *Economic Aspects of a Salt Water Barrier Below Confluence of Sacramento and San Joaquin Rivers*, Bull. No. 28), (1931), pp. 23, 30 and 87; D. W. R., *Salinity Incursion and Water Resources*, (April, 1962), Appendix to Bulletin No. 76, *Delta Water Facilities* (December, 1960) (Hereinafter cited as Bull. No. 76, *App. S. I. & W. R.*), pp. 36-38; D. W. R., *Delta Water Requirements* (February, 1962), Appendix to Bulletin No. 76, *Delta Water Facilities* (December, 1960), p. 105. H. E. Wittig, "Pre-Project Aspects of the Sacramento-San Joaquin Delta," unbound report for Region 2 of the U. S. Bureau of Reclamation (January, 1964), p. 7; B. O. R., *Feasibility Report*, p. 25; Richard B. Cunningham, "San Joaquin Delta: Is Negotiation a Solution," in *Legal Control of Water Pollution. U. C. D. Law* Review (1969), Vol. 1, p. 211; California State Water Rights Board, *Opinion by Board Member, W. P. Rowe, Concurring in Part With, and Dissenting in Part from, Decision D990* (1961), p. 13; Secondly, Bull. 27 has been ambiguously interpreted. Consider the quote reproduced in the text above as opposed to the following also taken from Bull. 27, p. 50: "It is important to note that even before extensive developments of irrigation, storage and reclamation works were made in the Sacramento and San Joaquin Valleys, there is ample evidence of the invasion of saline water from the lower bay into Suisun Bay and the lower channels of the delta; that this invasion of salinity has occurred every year during the summer and early fall months when the stream flow of the Sacramento and San Joaquin rivers was at its low stage. . ." Some researchers have interpreted this as meaning the western Delta experienced salinity incursion every year. Thompson, *Settlement Geography*, p. 23; Wittig, "Pre-Project Aspects of the Delta," p. 8; B. O. R., *Feasibility Report*, p. 13 and p. 25. It appears to this writer, however, from the discussion on salinity incursions, pp. 46-75 in Bull. 27, this is not the case.

Modified Stream Flow and Salinity Incursion

Around the turn of the century, reclamation in the Delta had reached 300,000 acres. Also, the scale of agriculture was increasing as garden size operations of asparagus, celery and tomatoes were enlarged to field operations. Sugar beets developed into an important cash crop and barley replaced wheat as the major winter grain crop.[122] By the end of World War I, the "Oriental influence" had given way to the "new industrial farming."[123]

In the Central Valley, a similar pattern was emerging. The demand for food, associated with World War I, resulted in an expansion in agricultural production.[124] In the semi-arid Central Valley, this resulted in a large expansion of irrigation. Table X illustrates the growth in irrigated acreage and irrigation diversions from the Sacramento and San Joaquin Rivers.

With the increase in agricultural acreage, there was an increase in diversions from the Sacramento and San Joaquin Systems. From 1900 to 1926, the gross annual irrigation diversions increased

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[122] Thompson, Settlement Geography, p. 312.

[123] Div. W. R., Report of Sacramento-San Joaquin Supervisor, 1924-1928, Bulletin No. 23 (1930), p. 365.

[124] By 1920, California, with only three percent of the nation's population, ranked fifth in value of farm crops; Div. W. R., Water Resources of California, Bulletin No. 4 (1923), p. 34.

TABLE X

ACRES IRRIGATED AND GROSS ANNUAL IRRIGATION DIVERSIONS FROM THE SACRAMENTO AND SAN JOAQUIN RIVER SYSTEMS

	(Exclusive of Sacramento-San Joaquin Delta)					
	Sacramento River		San Joaquin River		Totals	
Year	Acres Irrigated[a]	Irrigation Diversions[b] (Acre-feet)	Acres Irrigated[a]	Irrigation Diversions[b] (Acre-feet)	Acres Irrigated[a]	Agriculture Diversions[b] (Acre-feet)
1912	260,000	1,106,000	463,000	2,135,000	723,000	3,241,000
1913	286,000	1,094,000	494,000	2,130,000	780,000	3,224,000
1914	270,000	1,106,000	522,000	2,541,000	792,000	3,647,000
1915	286,000	1,154,000	540,000	2,352,000	826,000	3,506,000
1916	313,000	1,443,000	537,000	2,560,000	850,000	4,003,000
1917	351,000	1,567,000	579,000	2,755,000	930,000	4,322,000
1918	412,000	1,914,000	599,000	2,590,000	1,011,000	4,504,000
1919	474,000	2,329,000	618,000	2,281,000	1,092,000	4,610,000
1920	502,000	2,273,000	657,000	2,433,000	1,159,000	4,706,000
1921	448,000	2,221,000	669,000	2,643,000	1,117,000	4,864,000
1922	445,000	2,196,000	660,000	2,550,000	1,105,000	4,746,000
1923	438,000	2,138,000	719,000	3,002,000	1,157,000	5,140,000
1924	475,000	2,171,000	668,000	1,770,000	1,143,000	3,941,000
1925	463,000	2,108,000	743,000	2,745,000	1,206,000	4,853,000
1926	515,000	2,492,000	759,000	2,706,000	1,274,000	5,198,000
1927	525,000	2,654,000	794,000	3,203,000	1,319,000	5,857,000
1928	512,000	2,476,000	776,000	2,855,000	1,288,000	5,331,000
1929	537,000	2,425,000	780,000	2,707,000	1,317,000	5,132,000
1960[c]	1,400,000		1,160,000		2,560,000	
1970[d]		5,672,000		5,762,000		11,434,000

Source:
[a] D.W.R., Variation and Control of Salinity, Bull. 27, Table 12.
[b] D.W.R., Variation and Control of Salinity, Bull. 27, Table 13.
[c] Federal Water Pollution Control Administration, Central Valley Water Resource Study, March, 1970, p. 13.
[d] Bay-Valley Consultants, Recommended Water Quality Management Plan: Sacramento River Basin, San Joaquin River Basin, Sacramento-San Joaquin Delta (n.p.) July, 1974, p. 3-15.

from 1.5 M.A.F. to 5.8 M.A.F.

Of major significance is the fact that agricultural diversions occur from April to October and reach a maximum rate in mid-summer. This, of course, corresponds with the period of seasonal minimum runoff. Not all of the water diverted, however, is consumed by evapotranspiration as 35 to 45 percent of the diverted water is returned to the stream. However, the return flow, is delayed and up to 25 percent of the return flow is not available during the irrigation season in which it is diverted.[125]

Another consideration in stream discharge alteration is storage reservoirs. Table VI lists the accumulated storage capacity in the Sacramento River Basin. It has been pointed out, however, these early reservoirs probably had a negative impact on the natural low flow by encouraging diversions.[126]

In 1917-18, a low natural discharge plus increased upstream diversions produced the first critical year for salinity incursion in the Delta.[127] The discharge of the two rivers was 14.19 M.A.F. or only 45 percent of the mean. And, for the next 13 years, save 1920-21 with 101 percent of the mean, there was no water year in which the runoff was equal to the mean.[128]

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[125] Div. W. R., Bull. No. 27.

[126] See discussion accompanying N. 90 Supra.

[127] Ibid., p. 15, 20, 22, 29, 30, 31, 42, 150.

The winter of 1919-1920 brought a year of subnormal precipitation and it was obvious to all concerned that the salinity incursion was going to be even greater than in 1917-1918. Twenty-eight salinity observation stations were set up by the State and others.[129]

The most significant action taken in the dry period was the filing of a suit by the town of Antioch against the Williams Irrigation District on July 2. Claiming both riparian and appropriative rights the town asked the court to restrain the upstream William Irrigation District from diverting Sacramento River waters if the flow at Sacramento fell below 3,500 c.f.s. Antioch calculated this flow would hold back the salinity incursion and protect the quality of their municipal supply diversion which, at that time, averaged 1 c.f.s. Noting the town's prior appropriate right the court granted the injunction on January 7, 1921. An appeal in the California Supreme Court resulted in a reversal on March 23, 1922. Bulletin 27 summarizes the reasoning of the court:

> Antioch did not have a riparian right to the use of the water within the corporate limits of the city but that its rights in the San Joaquin River were those

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[128] Ibid., Table 39, p. 432.

[129] Ibid., p. 22.

> of a diverters and user of water thereof for beneficial purposes and nothing more. It further held that an appropriation or diverter of fresh-water from a stream at a point near its outlet to the sea does not, by such appropriation, acquire the right to insist that subsequent appropriators above should leave enough water flowing in the stream to hold the salt water of the incoming tides below his point of diversion.[130]

The Antioch court further pointed out the obvious solution to the situation was for both parties to cooperate and move Antioch's diversion point a few miles upstream. The court threw out the town's claim to a riparian right as the town, a water purveyor, did not own land riparian to the stream. In regards to legal solutions for the Delta growers these two points are rather significant. The growers are riparian and they cannot move their diversion point upstream with the ease as that of Antioch. Gindler and Holburt further theorize:

> No explanation has been found why delta landowners, who pushed the matter into litigation, did not themselves initiate or join the suit against the upper irrigators. Perhaps the delta landowners thought that the interference with a city water supply would be more appealing to a court than interference with agriculture, or that if Antioch prevailed, either as a riparian or as an appropriator, the decision would inure to their benefit. However, if Antioch lost, as it did, they could argue that the decision does not apply to their different situation. On the other hand, one might speculate that if the delta landowners,

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[130] Div. W. R., Bull. No. 27, p. 23.

> with their substantial uses and points of diversion that could not be moved upstream, had been plaintiffs, the court might have reached a different result.[131]

The Antioch suit was not a total defeat for Antioch and the Delta growers. Due to it much attention was given to the problem of salinity incursion and the State Division of Water Rights began to compile a bank of data for future studies.

The water years 1920-21 and 1921-22 were somewhat normal runoff years without a serious salinity problem. However, the winter of 1923-24 was one of the dryest on record and the runoff for the preceding year was only 59 percent of the long-time mean.[132] Also, stream diversions had continued to increase since 1917 (see Table X, p. 70). There could be no doubt that the summer of 1924 would witness the lowest discharge and the greatest salinity incursion on record.

On January 25 and 26, 1924, a meeting was held in Sacramento to discuss ways to minimize the salinity incursion. Titled the Sacramento River Problems Conference, the meeting was sponsored by the State Division of Water Rights and the Sacramento

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[131] Burton J. Gindler and Myron B. Holburt, "Water Salinity Problems: Approaches to Legal and Engineering Solutions" in University of New Mexico School of Law, Natural Resources Journal, Vol. 9, No. 3, July, 1969, p. 364.

[132] Div. W. R., Bull. No. 27, p. 432.

Chamber of Commerce. It was well attended and T. H. Means, a private engineer, gave a presentation which included the following invisionary statement:

> REMEDIES AND SOLUTIONS
>
> A great deal of thought has been given to these problems in the past four years. Nothing has been accomplished toward their solution. The most that can be said is that the lawyers have been getting clients in a better position to fight. Right here I would like to make a plain statement, and that is that the water problem of the San Joaquin-Sacramento Delta will never be settled in the courts. [*] Enough money has already been spent on litigation to go a long way toward a solution of the problem.[133]

The Conference produced a permanent committee called the "Sacramento River Problems Committee." The Committee appointed a Sacramento-San Joaquin Water Supervisor position to oversee the collection of stream flow salinity incursion data and published an annual *Sacramento-San Joaquin Water Supervisor's Report* until September of 1948. The water supervision work was then assumed jointly by the State Department of Public Works. The reports retained the original title until 1956 when the name was changed to *Surface Water Flow for 1956*. This became the first Bulletin 23 which is published annually as Bulletin 23--(identifying year).

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[133] T. H. Means, "Water Supply and Salinity in the Sacramento-San Joaquin Delta," Proceedings of the Sacramento River Problems Conference, January, 1924.

*Means, an engineer, supported an engineering solution--a salt-water barrier.

By providing a vehicle for cooperation, the committee was very effective in reducing the disastrous consequences of dry years. In 1931, the greatest known salinity incursion was experienced. The "Water Supervisor's Report for 1931" indicates the magnitude of the problem and the cooperation among the diverters in reducing the effects. Since the results of the low flow were a major plank in the platform for a State Water Plan, which eventually brought relief to the Delta, it is desirable to focus in on the 1931 low flow.[134]

The winter of 1930-31 was as dry or drier than that of 1924. By the middle of March, the Problems Committee held a meeting to make plans for minimizing the inevitable losses that would result in the summer. Of equal importance, the committee began to tool up for an investigation and determination of the losses. A letter was also drafted and sent to all of the diverters requesting a curtailment of plantings. Two other letters were spawned in this meeting; one to the holders of water permits issued since May 9, 1919,* termed Junior Priorities, from the Division of Water Resources, and a second to all diverters from the two streams from the District Engineer of the U. S. War Department. The letter sent to the Junior Permittees reproduced the following clause from their permits:

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[134] Infra. N. 136.

*The practice of issuing junior permits began after the first critical year. Supra N. 118.

> As there is a possibility that there will not be sufficient water in _____________ river during the latter part of the irrigation season to satisfy all requirements, this permit is issued subject to the express condition that the use hereunder may be regulated by the Division of Water Resources during such periods of water scarcity to the end that such use will not interfere with rights under prior applications.

Followed by the statement:

> If it becomes necessary, in order to comply with the water law, to regulate use, the latest priority will be the first to suffer and so on in order.

The letter from the District Engineer of the Corps of Engineers was similar in its gravity:

> ...the Department is charged by law with the maintenance of the navigability of the Sacramento River (among others), and is empowered to enforce restructions on any use of the water that would interfere with the requirements of navigation.

And,

> The War Department would be very reluctant to take action... However, unless prompt action be taken by those who divert water from the river, to reduce such diversions to the minimum actually necessary, and to stop the water wastage that is known now to exist, it is possible that the War Department may have to take action to reduce diversions for irrigation, in order that the interest of navigation may be protected.

The spring, like the winter, was dry and day after rainless day the situation worsened. The committee reconvened in Sacramento on April 13 to draft another letter which was also sent to the diverters. If a grower will voluntarily reduce his acreage, the letter read, he will be given first rights to divert, if in the summer reduction of diversions become necessary.

The aforementioned conditions are presented so as to underline the statement that the upstream diverters cooperated in conserving water, not because of any benevolent feelings for the Delta growers, but to preserve their own source of water. This is not to say the upstream diverters were not concerned with downstream conditions. Rather, the upstream diverters had to conserve water for their own use and by their so doing the salinity incursion was minimized.

Their endeavors reduced but by no means eliminated the degree of salinity incursion. (See Fig. 7) A major tributary of the Sacramento River, the Feather River, ceased to flow at its mouth on July 10. The growers petitioned the Pacific Gas and Electric Company to release additional flows from its upstream reservoirs. The company was already releasing the maximum capacity for its Caribou Power Plant downstream, but it released an additional amount bypassing the power plant. Also, a strict rotation of diversions was implemented before the water requirements could be met, and it was September before the river resumed its discharge into the Sacramento River.

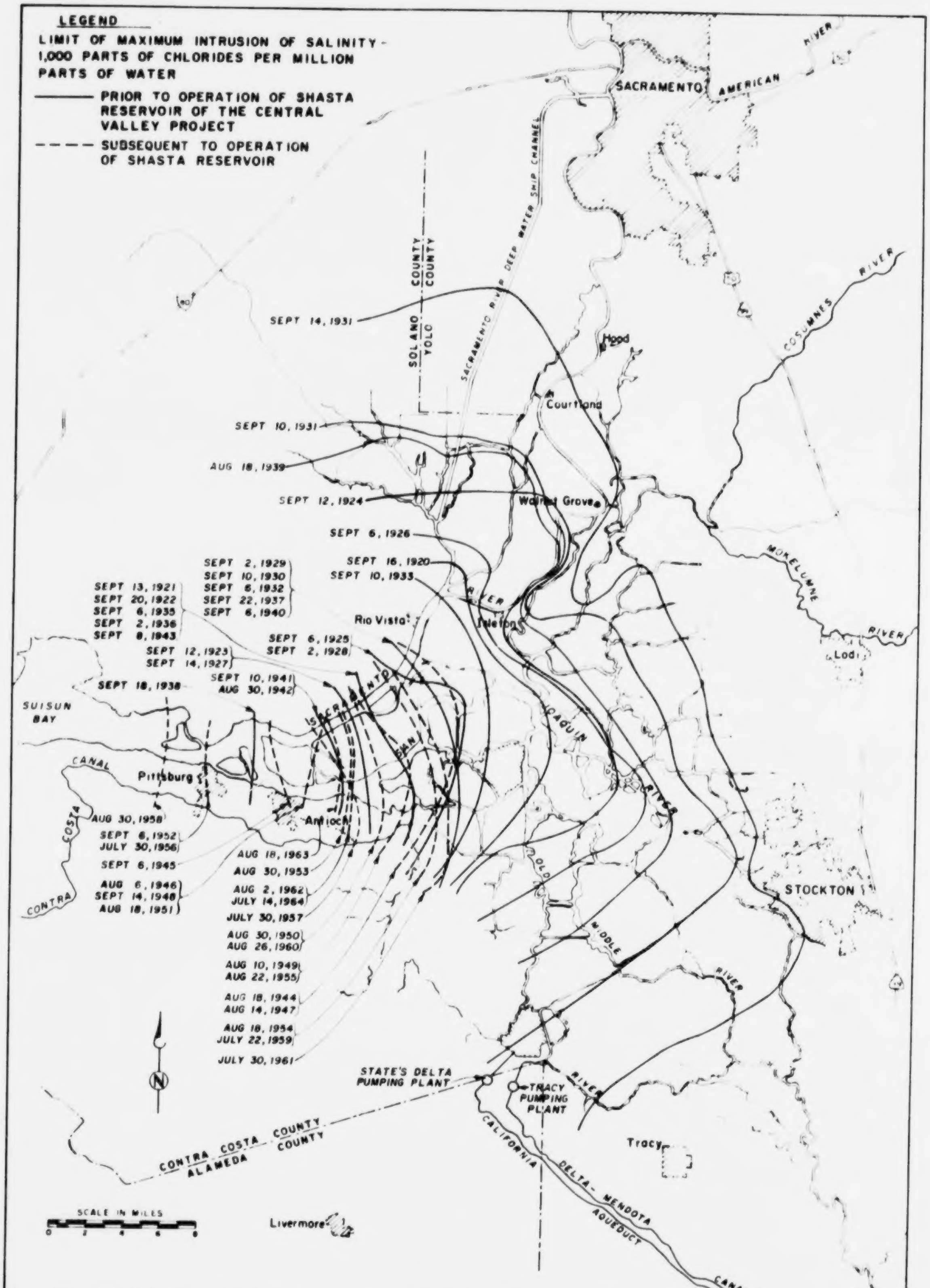
LEGEND
LIMIT OF MAXIMUM INTRUSION OF SALINITY- 1,000 PARTS OF CHLORIDES PER MILLION PARTS OF WATER
PRIOR TO OPERATION OF SHASTA RESERVOIR OF THE CENTRAL VALLEY PROJECT
SUBSEQUENT TO OPERATION OF SHASTA RESERVOIR
SACRAMENTO
AMERICAN RIVER
SACRAMENTO RIVER DEEP WATER SHIP CHANNEL
SOLANO COUNTY
YOLO COUNTY
COSUMNES RIVER
Hood
Courtland
Walnut Grove
MOKELUMNE RIVER
Lodi
Rio Vista
Isleton
SAN JOAQUIN RIVER
SACRAMENTO
SUISUN BAY
CANAL
CONTRA COSTA
Pittsburg
Antioch
OLD
MIDDLE RIVER
STOCKTON
STATE'S DELTA PUMPING PLANT
TRACY PUMPING PLANT
CALIFORNIA
DELTA-MENDOTA AQUEDUCT
CANAL
Tracy
Livermore
CONTRA COSTA COUNTY
ALAMEDA COUNTY
SCALE IN MILES
0 2 4 6 8
N
SEPT 14, 1931
SEPT 10, 1931
AUG 18, 1939
SEPT 12, 1924
SEPT 6, 1926
SEPT 16, 1920
SEPT 10, 1933
SEPT 2, 1929
SEPT 10, 1930
SEPT 6, 1932
SEPT 22, 1937
SEPT 6, 1940
SEPT 13, 1921
SEPT 20, 1922
SEPT 6, 1935
SEPT 2, 1936
SEPT 8, 1943
SEPT 6, 1925
SEPT 2, 1928
SEPT 12, 1923
SEPT 14, 1927
SEPT 10, 1941
AUG 30, 1942
SEPT 18, 1938
AUG 30, 1958
SEPT 6, 1952
JULY 30, 1956
SEPT 6, 1945
AUG 6, 1946
SEPT 14, 1948
AUG 18, 1951
AUG 18, 1963
AUG 30, 1953
AUG 2, 1962
JULY 14, 1964
JULY 30, 1957
AUG 30, 1950
AUG 26, 1960
AUG 10, 1949
AUG 22, 1955
AUG 18, 1944
AUG 14, 1947
AUG 18, 1954
JULY 22, 1959
JULY 30, 1961

Fig. 7. Historical Salinity Incursions (1920-1964)

The Sacramento River also dried up but not for so long a period. Table XI illustrates the mean daily discharge of the Sacramento River at Sacramento during the critical period. For twelve days there was no flow, and from May 8 to October 24, the flow fell below the amount necessary for delta consumption and salinity repulsion.[135]

The War Department failed to take action even though navigation was not possible above Sacramento. Nor did the Division of Water Resources curtail diversions by the Junior Permit Holders. Although it is not clear as to why, perhaps it was because of the spirit of cooperation that prevailed among the diverters.

As stated, the Problems Committee was fully prepared to measure the economic loss due to salinity incursion and by comparing the data collected during the low flow, it was possible to ascertain the losses for the previous years as well. The losses for this and several other years are reproduced in Table XII.[136]

The possibility of an annual incursion equal to or greater than that of 1931 was uppermost in the minds of the delta growers.

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[135] Div. W. R., Bull. No. 27, p. 226.

[136] The discussion of the 1931 low flow period was taken from: Div. W. R., Water Supervisor's Report for 1931, pp. 194-217.

TABLE XI

DAILY DISCHARGE OF SACRAMENTO RIVER AT SACRAMENTO
(MARCH - OCTOBER, 1931)

Day	Daily Discharge in Second-feet							
	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.
1	12,800	11,400	7,010	2,900	841	-3	1,310	3,670
2	12,500	11,500	6,800	2,490	698	106	1,430	3,790
3	11,800	11,600	6,920	2,180	702	162	1,530	3,920
4	11,600	11,200	7,010	1,930	692	286	1,410	3,850
5	11,400	10,500	6,990	1,700	610	230	1,440	3,690
6	11,100	10,100	6,520	1,590	503	206	1,670	3,570
7	10,700	10,100	6,130	1,560	409	237	1,800	3,360
8	10,500	10,100	6,220	1,560	348	219	1,840	3,420
9	10,000	9,570	5,470	1,420	221	268	2,010	3,590
10	9,630	9,070	5,010	1,310	209	319	2,300	3,760
11	10,200	8,870	4,450	1,170	78	250	2,610	3,660
12	13,600	8,270	3,950	1,180	61	345	2,940	3,520
13	16,600	7,970	3,770	1,130	51	373	3,220	3,460
14	19,400	7,530	3,690	1,080	58	369	3,360	3,450
15	20,200	7,090	3,960	1,220	25	402	3,510	3,580
16	18,700	6,710	3,710	1,490	8	369	3,520	3,760
17	17,100	6,590	3,820	3,750	-25	343	3,750	3,860
18	18,100	6,650	4,100	4,070	-79	455	3,810	3,760
19	24,900	6,740	4,520	4,490	-63	492	3,970	3,630
20	25,800	6,630	4,010	4,130	-91	480	3,990	3,710
21	26,000	6,400	3,040	3,350	-131	492	3,910	3,560
22	24,800	6,500	2,530	2,950	-112	600	3,940	3,660
23	22,500	6,460	2,230	2,710	-121	754	3,780	3,790
24	20,900	6,370	2,080	2,500	-111	735	3,840	5,010
25	19,200	6,230	2,160	2,090	-69	799	3,800	6,970
26	17,100	5,900	3,460	1,740	15	782	3,890	6,820
27	15,600	7,170	4,500	1,450	50	737	3,910	6,800
28	14,400	7,520	4,670	1,220	115	929	3,890	6,790
29	13,500	7,740	4,380	1,250	26	1,010	3,710	6,360
30	12,500	7,490	3,550	1,100	46	1,020	3,490	5,820
31	11,500		3,310		-7	1,130		5,520
Mean	16,000	8,200	4,520	2,080	160	480	2,990	4,330
Ac. Ft. for Month	981,000	488,000	278,000	124,000	9,830	29,500	178,000	266,000

Source: Sacramento-San Joaquin Water Supervisor's Report 1931, p. 41.

TABLE XII

ACREAGE IRRIGATED, ESTIMATED VALUE OF ACTUAL PRODUCTION, AND ESTIMATED LOSSES DUE TO SALINITY, SACRAMENTO-SAN JOAQUIN DELTA CROPS, 1924-1942

Year	Acreage Irrigated	Estimated Value of Actual Production in Dollars	Estimated Crop Loss Due to Salinity	
			Dollars	Percent of Total Value of Crop Production
1924	320,740	29,781,600	1,085,800	3.52
1925	300,227	30,108,700	12,200	.04
1926	308,712	26,295,000	346,700	1.30
1927	306,931	29,967,200	5,500	.02
1928	317,015	27,041,500	62,800	.23
1929	325,825	31,361,700	55,100	.18
1930	349,913	27,230,600	21,500	.08
1931	343,355	22,657,700	1,263,700*	5.28
1932	337,900	17,763,000	34,250	.19
1933	328,900	18,607,000	86,790	.46
1934	314,200	19,539,000	472,700	2.36
1935	319,000	20,569,000	3,700	.02
1936	312,700	27,401,000	5,020	.02
1937	317,100	23,372,000	7,290	.03
1938	338,400	19,100,000	-	.00
1939	334,800	21,095,000	384,900	1.79
1940	345,700	26,669,000	15,850	.06
1941	345,300	31,143,000	2,080	.01
1942	354,900	42,667,000	2,570	.01
Average	327,500	25,910,000	203,600	.82

* The loss is broken down as:

70% due to curtailment of irrigation	$ 890,906
29% due to irrigating with saline water	357,640
1% due to abandonment of crops	15,170
	$1,263,716

Source: Years 1924-1931 were published in the Water Supervisors Report for 1931, updated and reproduced in BOR, Central Valley Project Studies: Payment by Beneficiaries, Problems 10 to 13, 1947, p. 33.

The solution envisioned was an engineering one either a salt-water barrier or storage reservoirs to augment the summer flow. As will be presented in the next chapter, both were investigated fully and the augmented flow method was incorporated in the State Water Plan of 1931.

CHAPTER III

THE PLANNING DECADE AND THE STATE CVP

> Southern California has demonstrated the value of irrigation. Northern California illustrates its latent possibilities. When one considers the vast area of the Sacramento and San Joaquin Valleys, with a surface shaped by nature for the easy spreading of water, with a soil of great fertility and a marvellous climate, there is no doubt that it is to be during the Twentieth Century a great field of activity, not of the farmer alone, but the engineer, the lawyer, and the student of social and economic questions as well.
>
> Elwood Mead 1902
> (N. 156 Infra)

INTRODUCTION

This chapter traces the early activities of the state planners from the Alexander Survey in 1874 to the failure of the state to implement the state Central Valley Project, 1933 to 1935. Special attention is given to the recognition of the Delta salinity problem in this early planning period and the envisioned solution with the state CVP.

The State Water Plan was developed by state planners from 1921 to 1931 to serve as a guide for future water resources development. The Central Valley Project, with Shasta Dam as the key storage facility, was to be developed first as the backbone of the state plan. Other reservoirs and delivery systems would be added as the need developed.

Even though the state CVP received wide-spread endorsement it was not implemented as a state project. Federal grants for the scheme in the name of flood control and navigation were granted to the federal Bureau of Reclamation (Bureau or BOR). The CVP continues to be a federal Bureau of Reclamation project.

As a note of clarification, the reader should not confuse this early State Water Plan with the California Water Plan issued in 1957 by the state Department of Water Resources. In addition to the minor change in nomenclature there are other differences. Both plans were a broad look at the state's water needs but the 1931 State Water Plan pointed the way for the state Central Valley Project and the 1957 California Water Plan outlined the need for the State Water Project. Chapter V is devoted to the latter plan and Chapter VI examines the State Water Project; this chapter considers the 1931 State Water Plan and the State Central Valley Project; Chapter IV discusses the federal Central Valley Project.

THE SETTING

As so eloquently stated by Dr. Mead at the first of this chapter, few areas in the world are endowed with such a rich combination of physical features necessary for irrigation agriculture as the Great Central Valley. Long, frost free and high radiation growing seasons, ample water of excellent quality, a rich deep fertile soil of good texture and a gently sloping valley floor with minimum relief are present in enormous proportions.

Present agricultural statistics bear out the productivity of the Central Valley. It contains 6 of the 8.5 million irrigated acres and much of the irrigable acres in California, the state which leads the nation in farm production.[137] The San Joaquin Valley counties of Fresno, Kern and Tulare are among the top five agricultural counties in the nation, and only five states match or exceed the value of this valley's enormous output.[138]

Early settlers were cognizant of the irrigation attractiveness of the valley and they were annually vexed by the paradox of floods in the winter and parched land in the summer. Engineering solutions on a state-wide scale were sought and proposed as early as the 1870's. While the early proposals were physically possible economic, legal and political problems were, and remain, the formative foe to an orderly distribution of surplus water to the potentially productive valley soils.

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[137] Federal Water Pollution Control Administration and the U. S. Bureau of Reclamation, "Central Valley Water Resource Study," March, 1970, Table No. 2, p. 13. Gurmukh S. Gill, Edward C. Gray and David Seckler, "The California Water Plan and its Critics: A Brief Review,: in California Water, ed. by David Seckler, p. 4.

[138] Lantis, California, p. 384.

VISIONARY STAGE

The first comprehensive survey of the Central Valley was begun in 1873 when Congress instructed Lieutenant Colonel B. S. Alexander and two other engineers to examine and report on a system of irrigation in the San Joaquin, Tulare, and Sacramento Valleys of the State of California.[139] Known as the "Alexander Survey," the resultant report proposed a system of grant canals for irrigating the Central Valley. At the same time, the report indicated that the state was not ready for such a plan. Colonel Alexander concluded his survey with twenty-four points including:

1. Irrigation is but little understood in this country.
2. The cost of comprehensive system will be great but it may be the work of time.
3. The government should make a complete reconnaissance of the country to be irrigated.[140]

Colonel Alexander also indicated that such a large system should be operated by the government when he stated, "... it is the duty of the Government to teach the value of irrigation, and lay out a comprehensive system, and enforce proper laws on the subject."[141]

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[139] Act of March 3, 1873 (17 Stat. 622) in H.D. No. 416 (84:2) p. 22.

[140] Exec. Doc. No. 290, 43rd Cong., 1st sess., p. 77-80 (1874).

[141] _Ibid._, p. 40.

In keeping with suggestions and recommendations of the Alexander Survey, the California Legislature established the Office of the State Engineer in 1878.[142] Unfortunately, the office was maintained on an ad hoc basis. Each session the State Engineer made a report to the lawmakers and was allocated operating expenses until the next session.[143] The first State Engineer, William Hall, realizing the lack of permenancy for his office, tried to secure cooperation by collecting and presenting a great deal of hydrological data. The Legislators were not altogether satisfied and by 1881 Hall was accused of procrastinating the development of a state-wide plan to solve the increasing water problems in the state. Hall responded with the idea that a viable plan must be built with a great bank of hydrological data. He further called upon the Legislature to develop a realistic set of water laws for the state.[144] On both accounts, Hall was correct. Water interest within the Legislature were divided between mining and irrigated agriculture plus irrigation agriculture versus non-irrigation agriculture. Furthermore, the entire system of granting water rights in the state was chaotic. The few water laws and court decisions supported both the riparian doctrine and the appropriation doctrine. The riparian doctrine grants, equally, the flow of a stream to all diverters tangent to the stream. A riparian right is not lost by disuse and the user can use all the water he can put to a beneficial use unless he has to share the flow with other riparian users. The appropriator receives a water right for the water he diverts. At the time, there was no limit or restriction. A diverter could divert an unlimited amount of water for any use he might see fit, whether it be need or greed.[145] Probably nothing illustrates the existing confusion more than the fact that in 1902 there were three consecutive claims to all the water of the San Joaquin River, and "... the aggregate of all claims in California represents enough moisture to submerge the continent."[146]

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[142] Cal. Stats. 1878, Ch. 429.

[143] Charles P. Korr, "William Hammong Hall: The Failure of Attempts at State Water Planning in California, 1878-1888, Southern California Quarterly, Vol. XLV, Number 4 (December, 1963), p. 308.

[144] Ibid., p. 311, see N. 146, Infra.

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[145] For a background on the early development of California's water laws and the conflicts between the riparian and appropriative rights see the main opinion of the U. S. Supreme Court in U. S. v. Gerlach Livestock Co. (399 U. S. 725, 1950) reproduced in U. S. 85th Cong., 1st sess., House Committee on Interior and Insular Affairs, Central Valley Project Documents (Vol. II), House Document No. 246 (1957) pp. 715-723.

[146] U. S. 57th Cong., 1st sess., U. S. Department of Agriculture, Office of Experiment Stations Report of Irrigation Investigations in California, under the direction of Elwood Mead, Senate Document No. 356 (1902) p. 36. A more in depth analysis of the legal problems at this time are found in pp. 29-70 of the report.

By 1888 the rift between Hall and the Legislature had grown to such proportions the Legislature terminated the office.[147] This short-sighted action cost the state several years of valuable hydrological data -- a necessity for planning the utilization of the streams.

State involvement in developing a state water plan languished until 1921 (See Appendix A). A Commissioner of Public Works was appointed in 1893[148] but the meager publications dealt with a few isolated studies[149] until its function was taken over by a Department of Engineering in 1907.[150] Also, a Debris Commissioner was appointed by the Governor in 1893, as directed by the Legislator, to work with a Federal Debris Commission in regards to the debris resulting from hydraulic mines.[151] This office was also absorbed in 1907 and the few reports that were published did not deal with any problems outside of its appointed purpose.[152] Appendix A consists of a flow sheet outlining the state agencies involved in water resources development and management.

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[147] Korr, "William Hammond Hall," p. 314; One researcher states that the move by the legislature was a result of the political muscle of the strong Southern Pacific machine. Hall wanted to abolish the riparian water rights doctrine. Southern Pacific, however, with large land holdings riparian to streams, did not want to relinquish these rights. Arthur Desco Angel, "Political and Administrative Aspects of the Central Valley Project California." (Unpublished Ph. D. dissertation, University of California, Los Angeles, 1944), p. 38.

[148] Cal. Stats. 1893. Ch. 232.

[149] Seven reports, compiled by the Commissioner, can be found in California Legislature. Senate and Assembly. Appendix to the Journals: 32d, S., V. 4, V. 2, V. 7; 34th S., V. 2; 35th S., V. 2; 36th S., V. 2; 37th S., V. 3.

[150] Cal. Stats. 1907. Ch. 183.

The most dynamic impetus for a state wide plan in this early period was provided for by the Mead Reports of 1901 and 1902.[153] In 1900 a group of concerned citizens solicited the U. S. Department of Agriculture for the services of Elwood Mead. They succinctly stated (in part):

> We respectfully submit that nowhere in America are there irrigation problems more important, more intricate, or more pressing than in California. Great sums have been lost in irrigation enterprises. Still greater sums are endangered. Water titles are uncertain. The litigation is appalling.[154]

With a team of investigators, Dr. Mead reported on the legal, economic and administrative aspects of the water problem. He also foresaw a tremendous potential for irrigation in the state and he demonstrated a keeness of foresight with the following portentous statement:

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[151] Cal. Stats. 1893. Ch. 228.

[152] Published biannually, the reports are contained in California Legislature. Senate and Assembly. Appendix to the Journals: 31st S., V. 6; 32d S., V. 5; 35th S., V. 2; 36th S., V. 2; 37th S., V. 3.

[153] U. S. 56th Cong., 1st sess., U. S. Department of Agriculture, Office of Experiment Stations, Preliminary Report of Irrigation Investigations in California, under the direction of Elwood Mead, Senate Document No. 108 (1901) this document is a prelimary report to the one cited Supra N. 146.

[154] S. Doc. 108 (56:2) p. 10.

> It is beginning to be realized that the arid West has some problems which are new to the people of this country; that there is being laid in the West the foundation of an industrial civilization different from that of the East and capable of better results, if wise laws and just policies shall prevail. It is a civilization which requires that every farmer shall be a thinker as well as a worker, and in which the value of the home depends more on institutions than on either a fertile soil or ample water supply. No state illustrates these truths more clearly than California. . . . because in no other State have water and land so great a value, and because in no other State are the evils and abuses of imperfect and inadequate legislation so clearly manifest.[155]

And the often quoted provident observation:

> Southern California has demonstrated the value of irrigation. When one considers the vast area of the Sacramento and San Joaquin Valleys, with a surface shaped by nature for the easy spreading of water, with a soil of great fertility and a marvelous climate, there is no doubt that it is to be during the Twentieth Century a great field of activity, not of the farmer alone, but the engineer, the lawyer, and the student of social and economic questions as well.[156]

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[155] S. Doc. No. 356 (57:1) p. 20.

[156] Ibid., p. 26. Quoted by Bains, et. al., Northern California Water Industry, preface. Also quoted in U. S. 84th Cong., 2d sess. House Committee on Interior and Insular Affairs, Central Valley Project Documents (Vol. 1), House Document No. 46 (1956) p. 54. This document cites the 1901 document (see Supra N. 153) but the statement appears in the 1902 document as noted.

From these statements it is obvious that Dr. Mead (an engineer) considered that the engineering problems were greatly overshadowed by the institutional problems.

Recognition of the Salinity Problem

The reports plus growing water problems catalyzed a great deal of activity by the engineers and lawmakers. A department of Engineering was established in 1907.[157] Cooperating with the federal agencies, the Conservation Commission and the State Water Commission (both created in 1911), stream measurements were made throughout the state.[158] The Conservation Commission was also instructed to investigate and collect information concerning all the natural resources. The Commission delivered its report to the Governor and the Legislature in 1913 and while many resources were considered, water commanded 373 of the 502 pages.[159] In this comprehensive study, covering all aspects of the water problem, no attention was given to the potential salinity incursion. In fact, the very opposite was considered as the report incorrectly stated in regards to the San Joaquin Delta lands. "They are more affected by an over supply of water [floods] than by a scarcity and no development on the tributary rivers will ever be so complete but that waste and return flow will be sufficient for these lower areas."[160]

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[157] Stats. 1907, Ch. 183.

[158] Stats. 1911, Ch. 408; stats. 1911, ex. sess., Ch. 41.

[159] California Conservation Commission, Report, Transmitted to the Governor and the legislature January 1, 1913. passim pp. 19-43, 81-429.

When the State Water Commission was created in 1911 it was given the authority to accept applications for water rights and conduct investigations.[161] The Commission began to produce biennial reports in 1913 but salinity incursion did not receive attention until October of 1916 when the potential first was realized. Investigations of increasing intensity followed in September of 1919 and 1920.[162]

Consultation followed consultation and the 1915 Legislature passed an act instructing the Governor to hold a conference to consider the related problems of irrigation, reclamation, water storage, flood control and drainage.[163] The State Water Conference was held in 1916 and by this time the irrigation diversions had increased to such proportions navigation on the Sacramento River was threatened by the reduced flows.[164] This is a most significant point as the minimum flows that maintain navigation, also reduce the salinity incursions. As pointed out in Chapter II the Corps acted to preserve the navigation flows, but in the early days of the conflict they played a passive role.[165] No policy decision was made and official minimum flows were not established. Clearly the Corps had the power and the responsibility to protect navigation as "Withdrawal of water for any purpose from a navigable waterway is not permissible under the law save with consent of the War Department, which controls such waterways in the interest of navigation and commerce.[166] There were only two permits issued on the Sacramento and one was forfeited by default. An investigation by the United States Geological Survey in September 1916 turned up sixty-nine diverters on a 178 mile section of the Sacramento.[167]

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[160] Ibid., p. 222. There was no consideration of the Sacramento Delta per se it was considered with the Sacramento Valley.

[161] This Commission took over the functions of the State Board of Control created nine months previously; stats. 1911, Ch. 406. In 1913 a new State Water Commission was created which also made investigations; stats. 1913, Ch. 586. A referendum petition suspended the law in November, 1913 but it was approved by the voters in 1914; Dorthy Campbell Tompkins, Water Plans for California: A Bibliography (University of California, Berkeley). April, 1961, p. 17, 18. See also Appendix A.

[162] State Water Commission, Third Biennial Report, Appendix D: Salinity Investigations in the Sacramento and San Joaquin Delta (Sacramento, 1921), p. 85.

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[163] Cal. Stats. 1915, Ch. 359.

[164] State Water Problems Conference, Report, November 25, 1916, p. 80.

[165] See discussion accompanying Ns. 134-136, Supra.

[166] Water Problems Conference, Report, p. 80.

Unofficially it was felt in this early period that a discharge of 5,000 second feet at Sacramento was the necessary minimum flow for navigation.[168] In 1908 the flow dropped to 6,300 second feet and in 1913 to 5,700 second feet.[169] As the flows were further reduced for longer periods in subsequent years, the Corps discouraged diversions but failed to display a "bigstick" policy.[170]

Marshall and the Dry Decade

A dry cycle which began in 1918 resulted in the abandonment of newly irrigated lands in the Southeastern San Joaquin Valley where the groundwater was either exhausted or lowered below retrievability. By 1937 almost 50,000 acres of improved farms were abandoned.[171] The arid conditions plus the general economic and agricultural recession of the twenties demanded a statewide solution.

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[167] Ibid., p. 80.

[168] Ibid., p. 80. This estimated figure was subsequently scaled down to 3300 c.f.s. in 1930. Division of Water Resources, Report of the Sacramento-San Joaquin Water Supervisor for the period 1924-1928. Bull. No. 23, 1930, pp. 21-22.

[169] Water Problems Conference, Report, p. 82.

[170] See the address by Colonel U. S. Grant, III, District Engineer for the War Department before the second Sacramento-San Joaquin River Problems Conference, December, 1924 in Div. of W. R., Supervisor's Report for 1924-1928. Bull. No. 23, 1930, p. 5-6.

The first comprehensive water resource development plan was proposed by Colonel Robert Bradford Marshall. For almost twenty years Marshall had formulated his plan while he surveyed the state for the United States Geological Society.[172] Retiring from the Geological Society, Colonel Marshall presented his plan to the Governor on March 16, 1919.[173] Marshall's scheme contained his wealth of professional knowledge as well as a wealth of imagination: The solution was grandiose. It was formulated on a series of basin exchanges from the water surplus north to the water deficient south. The Kern River would be tunneled south through the Tehachapi Mountains to parallel the Los Angeles Aqueduct which was already constructed from the Owens Valley to Los Angeles. Another grand canal from the Sacramento River would travel the length of the east side of the Central Valley, swing around the southern Tulare basin and travel northward on the west side to Dos Palos. From the origin point on the Sacramento, another canal would travel down the west side of the Sacramento Valley, cross Carquinez Strait by an inverted syphon and continue up the San Joaquin Valley to meet the other canal at Dos Palos. The Kern River waters diverted out of the valley to Los Angeles would be replaced by diverting an equal amount, 2 M. A. F., from the Klamath River on the California-Oregon border into the Sacramento Basin.

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[171] Testimony of Congressman Alfred Elliott testifying on the Rivers and Harbors Bill of 1937 in Congressional Record. Proceedings and Debates of the 1st sess., 75th Cong., Vol. 81, Part 6. June 18, 1937 to July 13, 1937. pp. 6712-6713, in U. S. Department of Agriculture. Bureau of Agricultural Economics, History of Legislation and Policy Formation of the Central Valley Project, by Mary Montgomery and Marion Clawson. Berkeley, 1946. pp. 85, 86.

[172] The Geological Society sent Marshall, a hydrological expert, to California in 1891. Surveying the state for eleven years he was placed in charge of the surveying in 1903. Five years later he became the geographer in charge of the Topographical Branch for the entire United States; Angel, "Aspects of the Central Valley Project," p. 39.

[173] Ibid., p. 39.

Without reservation Marshall averred the plan would:

1. Supply jobs and land for the unemployed and soldiers.
2. Not cost the State or Federal Government a single dollar.
3. Irrigate 12,000,000 acres.

Furthermore, Marshall considered his proposal "...one large ideal opportunity"...that..."can be finished and in full operation with assured success in ten years"..."small ideas have no place in California."[174]

In retrospect Marshall was charlatanical; yet, his plan was effective; small plans do not stir men's blood. In 1921 he took his plan and campaign to the California Assembly where "He was damned and called crazy, but emerged with an appropriation of $200,000 for the state engineers to investigate his plan."[175] Soon after Col. Marshall lost his voice as the arguing with the Legislators, doctors believe, strained his vocal cords.[176] For his endeavors Marshall received the unofficial title of Father of the Central Valley Project.[177]

A Plan Emerges

The Department of Public Works returned to the Legislature in 1923 with the voluminous studies authorized in 1921. The five publications consisted of a preliminary report for utilizing the state's water and in a general way represents the present day Central Valley Project.[178] The Central Valley Project was to be the initial unit of the State Water Plan. The key units were Kennett (Shasta) Dam[179] on the Sacramento above Redding and Friant Dam on the San Joaquin River. The Friant-Kern Canal would divert the San Joaquin River water south to Kern County and surplus waters from the Sacramento would be transferred to the San Joaquin Valley (see Fig. 1). To transport water up the San Joaquin Valley a series of fourteen, low-level dams were proposed on the San Joaquin River.[180] The waters would be pumped up from pool to pool in stair step fashion. To facilitate the exchange of water from the Sacramento to the San Joaquin River a Carquinez Strait Dam was planned.[181]

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[174] Colonel Robert Bradford Marshall, "California's Greatest Opportunity - Reclaiming an Empire - The Valley of California" in Irrigation of 12 Million Acres in the Valley of California, pamphlet distributed by the California State Irrigation Association (Sacramento: November, 1920), passim. pp. 7-12.

[175] The Sacramento Bee, June 21, 1949, p. 5; Cal. Stats. 1921, Ch. 889.

[176] The Sacramento Bee, June 21, 1949, p. 5.

[177] Ibid., p. 5; Sacramento Section of the American Society of Civil Engineers, "The Engineerogram", Vol. XI, No. 6 (August, 1949), p. 1. One source, however, gives this title to a State Engineer, Edward Hyatt; Korr, "William Hall," p. 317.

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[178] The plan is presented in Division of Water Resources (hereinafter referred to D. P. W.), Water Resources of California, Bull. No. 4 (1923); The accompanying four bulletins are published as Appendix A, Flow in California Streams, Bull. No. 5 (1923); Appendix B, Irrigation Requirements of California Lands, Bull. No. 6 (1923); Appendix C, Utilization of the Water Resources of California, Bull. No. 7 (1923); Appendix D, Relation of Settlement to Irrigation Development, Bull. No. 8 (1923).

[179] Kennett was renamed Shasta by the Commissioner of Re-clamation, John C. Page, at a dedication ceremony on September 12, 1937. The name Kennett was taken from a small community at the damsite. The State of California officially adopted the name "Shasta" by amendment to the Water Code in 1941.

[180] D. P. W., Water Resources of California, Bull. No. 4, p. 13.

[181] *Ibid.*, p. 12.

The dam would create a freshwater lake to supply growers, municipalities and industry in the Delta area as saline bay waters would be kept out. Equipped with aqueducts, the freshwater pool would also supply the municipalities in the Bay Area. This multipurpose unit was further justified as it would provide a low-level crossing for a highway and a railroad.[182]

The plan presented in 1923 (Bulletin No. 4) was considered a preliminary plan,as much additional research was needed. For reasons not clear the financial support for the continuing investigation was provided by a $90,000 donation from the Chambers of Commerce of San Francisco and Los Angeles.[183] This resulted in a study (Bulletin No. 9) which was presented to the 1925 Legislature.[184] In regards to the proposed salt water barrier the study stated:

> The barrier is an integral unit of the comprehensive plan for ultimately conserving the waters of the Great Central Valley. In addition to acting as a

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[182] Ibid., p. 48.

[183] California Legislature. Joint Committee, Report of the Joint Committee of the Senate and Assembly for an Intensive Study of the Water Resources of California and the State Engineer's Coordination Plan for Their Development. (1927) p. 3.

[184] D. P. W., Supplemental Report On Water Resources of California, Bull. No. 9 (1925).

> dam diverting Sacramento River waters into the lower San Joaquin River, it would maintain a large fresh water pond. . . .[185]

and,

> To date, the explorations show that it is physically possible to construct a barrier at any of the three locations. The costs have not yet been determined.[186]

The 1925 Legislature saw fit to repay the $90,000 to the Chambers of Commerce and grant $150,000 to the Department of Public Works for additional investigations.[187] By the third refinement of the study a definite plan was taking shape. This plan, presented in 1927 (Bulletin 12) proposed a total solution:

> This plan provides for the storage of floodwaters for conservation purposes, the transportation of surplus waters of the Sacramento drainage basin to the deficient areas in the San Joaquin Valley, an adequate summer flow in the Sacramento River for navigation, storage of hydraulic mining in the Sierra Nevada Mountains (the reservoirs would capture the debris), the control of floods by reservoirs, the expansion of irrigation along the lower Colorado River in southeastern California, and the diversion of water from the river to the Pacific slope for municipal purposes.[188]

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[185] Ibid., p. 45.

[186] Ibid., p. 45.

[187] Joint Committee, Report (1927), p. 3. Cal. Stats. 1925, Ch. 47.

[188] D. P. W., Summary Report on the Water Resources of California and a Coordinated Plan for Their Development, Bull. No. 12 (1927), pp. 26-27.

It is obvious the plan was not only designed to solve the water problems of the state, but to collect the votes as well. The engineers withdrew their support for the salinity barrier in this report due to the cost. "... The barrier would cost more than reservoir releases..." and it was deduced that, "... the volume of water desirable for navigation in the Sacramento River is adequate for both saltwater control and diversion into the San Joaquin Valley for a long time."[189]

Yet the barrier had not suffered a complete demise. The Legislature continued to support it and engineers continued their barrier investigations.[190]

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[189] Ibid., p. 37.

[190] D. P. W. Water Resources Investigation Studies of Sedimentation of the Sacramento River and in the Bays, Effect of Debris Deposits on the Navigability of the Rivers and Bays and on the Proposed Trans-Bay Barrier, unnumbered report, January, 1927; D. P. W., "Salt Water Barrier Investigation, Statutes, Bibliography and Notes, unnumbered report, 1929; D. P. W., "Report on Salt Water Barrier", Bull. No. 22, Vol. 1, 1929; D. P. W., Industrial Survey of Upper San Francisco Bay with Reference to Salt Water Barrier, Bull. No. 28-A, 1930; D. P. W., Salt Water Barrier Investigation, Bibliography and Notes of Design and Construction, unnumbered report, March, 1930; D. P. W., Salt Water Barrier Investigation Preliminary Design and Estimate for Barrier at Chipps Island Site, unnumbered report, March, 1930; D. P. W., Preliminary Report, Evaporation and Transpiration Losses from Proposed Salt Water Barrier Project, unnumbered report, July, 1930; D. P. W. Progress Report of Salt Water Barrier Investigation, unnumbered report, July, 1930; D. P. W., Salt Water Barrier Investigation, Progress Report 2, October, 1930; D. P. W., Economic Aspects of Salt Water Barrier Below Confluence of Sacramento and San Joaquin Rivers, Bull. No. 28, 1932.

Bulletin 12 also described the worsening conditions in other parts of the state which pressed for a quick solution. It states "...there are now about half a million acres in the Southern San Joaquin Valley that are either overdrawing their underground water supplies or are approaching this condition."[191] The recommended solution was to import water as, "...there is no way to stop the sinking of new wells. All the overlying lands have a legal right to pump from the underground sources if they choose."[192]

The 1927 Legislature established a Joint Committee of the Senate and Assembly to study water problems.[193] This Joint Committee reported, "The committee immediately upon commencing its work became impressed with the magnitude of the project contemplated and the momentous consequences to follow any decision of the Legislature."[194] And, "...the agency which controls the natural resources of any state or nation controls the destiny of its people."[195]

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[191] D. P. W., Water Resources of California, Bull. No. 12, 1927, p. 35.

[192] Ibid., p. 35.

[193] Cal. Stats. 1927, Ch. 30.

[194] Joint Committee, Report, 1927, p. 3.

[195] Ibid., p. 3.

In 1929 the Joint Committee reported to the Legislature on all aspects of the water plan except financing which would be covered in a supplemental report.[196] The dry cycle, initiated in water year 1917-18, was still persisting in the Central Valley and each dry year intensified the problems. The committee felt the valley had "...almost reached the limit of economic development of its water resources under the present policy of the state and under present conditions. Large agricultural areas and present investments are in danger of retrogression and depreciation; and all interests are more or less unstable on account of the threatened litigation and uncertainty of future water supply.[197] As a further illustration of the severity of the problem, federal farm loans were discontinued south of the Kings River due to the falling groundwater levels.[198] The Committee also noted the salinity problem and concluded the state should construct and operate Kennett Dam on the Sacramento River, a salt water barrier and the fourteen dams on the San Joaquin River.[199]

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[196] California Legislature Joint Committee, *Report of Joint Committee of the Senate and Assembly Dealing with the Water Problems of the State*, January 18, 1929 , p. 21.

[197] *Ibid.*, p. 12.

[198] *Ibid.*, p. 12.

By April, 1929 when the supplemental report was submitted, the committee had reversed its decision on the salt water barrier. Kennett Dam was to be operated as a multipurpose unit and would supply the water needs of the Sacramento River and the Delta, supply the needs for the San Joaquin Valley, provide for navigation and flood control, as well as protect the Delta from the salinity incursion.[200] The Committee summarized its position on the proposed barrier with the statement:

> The State Engineer and consulting engineers in the state report have continuously refused to recommend the saltwater barrier as one of the first units to be constructed by the State on the ground that the Kennett project would produce greater benefits at a less expense to the State.[201]

The Committee, however, was not in total agreement. William R. Sharkey, supporting the barrier, filed an additional supplemental report.[202] Sharkey indicated the barrier omission was due to sectionalism. The Water and Power Bureau of Los Angeles County had requested to build the Colorado River Aqueduct which would eliminate a "...balanced program upon which a state-wide bond issue could be predicated."[203] Furthermore, the assured fresh water supply which would result from the barrier would "...establish on the San Francisco Bay probably the greatest industrial area on the Pacific Coast. Southern California may not vote for a plan that would give San Francisco Bay such an advantage with nothing for Los Angeles."[204] Thus:

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[199] Ibid., p. 21.

[200] California Legislature Joint Committee, Supplemental Report of the Joint Committee of the Senate and the Assembly Dealing with the Water Problems of the State. April 19, 1929 , p. 195.

[201] Ibid., p. 197.

[202] William R. Sharkey, "Supplemental Report of William R. Sharkey", attached to Supplemental Report 1929 .

> THE ELIMINATION OF THE BARRIER, THEREFORE, FROM THE PROGRAM AT THIS TIME IS ACCOMPLISHED NOT BECAUSE OF THE LACK OF MERIT OR NECESSITY OF THE BARRIER, BUT BECAUSE OF POLITICAL EXPEDIENCY.[205]

While Sharkey's reasoning may not be supported for a lack of evidence, it nonetheless may be credible. As will be later discussed, Southern California voters almost defeated the Central Valley Project in a referendum.

If the engineers realized and/or the lawmakers suspected the potential, physical shortcomings, it did not show up in the literature. The Joint Committee recommended the adoption of the plan[206] and the Legislature authorized the final study which was presented to the 1931 Legislature as the State Water Plan.[207]

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[203] Sharkey, Supplemental Report, 1929, p. 202.

[204] *Ibid.*, p. 202.

[205] Ibid., p. 202. Emphasis original.

SALINITY CONTROL AND THE STATE CVP

Concurrent with this study were two studies dealing with the salinity problem. One study analyzed the relationship between the variation of stream flow and salinity incursion while the other study consisted of a comprehensive financial evaluation of the proposed salt water barrier. The latter concluded that the capital and annual costs of a barrier would be twice that of salinity control by fresh water releases. Also, a barrier would hinder navigation, raise the water level in the Delta, resulting in additional drainage and levee maintenance, damage the fishing industry and create a cesspool behind the barrier.[208] Both studies concurred that salinity control should be maintained with a fresh water outflow of 3,300 c.f.s. (cubic feet per second or second feet) at Antioch.[209]

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[206] Joint Committee, Supplemental Report, 1929, p. 195.

[207] Cal. Stats. 1929, Ch. 832, D.P.W., Economic Aspects of Salt Water Barrier, Bull. No. 28, 1932, p. 43.

[208] D.P.W., Economic Aspects of Salt Water Barrier, Bull. No. 28, 1932, p. 43.

[209] Ibid., p. 43; D.P.W., Variation and Control, Bull. No. 27, pp. 41, 44, 223, 224, 232, 238, 243.

Based on these conclusions Bulletin No. 25, State Water Plan, incorporated these results:

> In order to effect a positive control at Antioch sufficient to limit the increase of salinity at that point to a mean degree of not more than 100 parts of chlorine [sic] per 100,000 parts water, with decreasing salinity upstream. In order to effect a positive control of salinity at Antioch to this desired degree, a flow of 3,300 second feet in the combined channels of the Sacramento and San Joaquin rivers past Antioch into Suisun Bay would be required. This would necessitate a maximum gross rate of inflow into the delta at the time of maximum consumptive use of water in the delta in the midsummer of about 7,000 second-feet.[210]

The engineers calculated 2,390,000 AFA (acre feet per annum) would maintain the year-round 7,000 c.f.s. minimum flow with the then present conditions.[211] As diversions increased on the Sacramento River, it was predicted, the 2,390,000 figure would grow to 3,590,000 AFA.[212] It was also pointed out that most of these flows would be unregulated, natural flows supplemented by release flows. A normal runoff year, such as 1927, would require only 150,000 acre-feet of release flows while a dry year like 1924 would have required 1,128,000 acre-feet.[213] These figures may, however, be overly optimistic for the following. In 1924 the water needs were not satisfied for the Sacramento Valley because crop acreage was reduced in anticipation of a dry year.[214] With a reservoir to firm up the supply, the diversions would have been greater and the natural flow smaller with a proportionate increase in reservoir releases. The planners should have realized that with an annual firm supply of water, acreage would not be held in check by the occasional dry years and it would expand rapidly. Therefore, it is poor reasoning to calculate the future supplemental releases of a reservoir, based solely upon past conditions without a reservoir.[215] Also to be considered is that Kennett Reservoir was only programmed to yield an annual gross of 2,850,000 acre-feet.[216] Thus, there is some doubt as to whether the reservoir could accomplish the following purposes (among others):

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[210] D. P. W., State Water Plan, Bull. No. 25, p. 79.

[211] Ibid., p. 80.

[212] Ibid., p. 111.

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[213] Ibid., p. 129.

[214] See the discussion accompanying Ns. 134-136 Supra.

[215] This lack of foresight resulted in a cost of $500 million and 20 years of negotiation for the Bureau of Reclamation. Sacramento River diverters used 1 MAF before the project was constructed and an additional .33 MAF were allocated from the increased supply. However, diversions increased to 2 MAF by 1951. The Bureau favored adjudication of the stream but political pressure on the Secretary of Interior resulted in negotiation and settlement. The diverters received 1.789 MAF free and an additional .5 MAF at $2 per acre-foot; David L. Shapiro, "The Sacramento Diverters Controversy-A Study in the Legal Adjustment of Externalities", Water Resources Bulletin, Journal of the American Water Resources Association, Vol. 7, No. 6 (December 1971), passim., pp. 1267-1272

3. Irrigation demands on the Sacramento River would be supplied, without deficiency, up to 6,000 second-feet maximum draft in July (372,000 acre-feet).

4. An irrigation supply without deficiency would be furnished the Sacramento-San Joaquin Delta for its present requirements.

5. A fresh-water flow would be furnished of not less than 3,300 second-feet past Antioch into Suisun Bay, controlling salinity to the lower end of the Sacramento-San Joaquin Delta.

6. A water supply without deficiency would be made available in the delta for the developed industrial and agricultural areas along the south shore of Suisun Bay in Contra Costa County.

7. An irrigation supply without deficiency, would be made available in the Sacramento-San Joaquin Delta sufficient in amount to fully supply the "cropped lands" now being served from the San Joaquin River above the mouth of the Merced River. This would be conveyed to these lands by the San Joaquin River Pumping System and would make possible the exportation of all the available supply in the San Joaquin River at Friant.[217]

The point is thusly made that the original State Water Plan in all probability would not have been able to meet all project requirements and protect the Delta from salinity incursions. However, salinity control was incorporated into the plan and the authorizing legislation.[218]

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[216] D. P. W., State Water Plan, Bull. No. 25, p. 131.

[217] D. P. W., Variation and Control, Bull. No. 27, p. 238.

The year 1931 marked the end of the early planning stage and in the next two years attention was directed to the economic, legislative, legal and financial aspects. The legislative Joint Committee held over forty meetings throughout the state from July 3, 1931 to March 20, 1932[219] and in 1933 the Legislature enacted the Central Valley Project Act.[220]

Even though some questions have been raised in regards to the physical feasibility of the project, there is no doubt that salinity control was a primary function as the following quote from the authorizing act testifies:

> Said unit is designated as the Kennett Dam, and shall be constructed and used primarily for improvement of navigation on the Sacramento River to Red Bluff, for increasing flood protection in the Sacramento Valley, for salinity control in the Sacramento-San Joaquin Delta, and for storage and stabilization of the water supply of the Sacramento River for irrigation and domestic use, and secondarily for the generation of electric energy and other beneficial uses.[221]

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[218] N. 221, Infra. Codified in Cal. Water Code at Sec. 11207.

[219] Tompkins, Water Plans for California, p. 37.

[220] Cal. Stats. 1933, Ch. 1042.

[221] Ibid.

The industrial south shore of Carquinez Strait in Contra Costa County would be supplied with a freshwater canal originating in the Delta.[222] Thus, the Delta and the industrial area stood to benefit greatly from the project.

ATTEMPTS AT IMPLEMENTATION

Only thirty-three percent of the registered voters endorsed the Central Valley Project Act on December 19, 1933 authorizing the issuance of $170 million in revenue bonds and the basic features of the project.[223] The measure passed with a 33,603 vote margin (54 percent) out of an 885,821 total.[224] The Los Angeles Times,

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[222] Ibid.

[223] One possible reason for the lack of voter interest is that the major metropolitan areas had independently engineered their own solutions. Los Angeles extended an aqueduct into the Owens Valley as early as 1913 and the now powerful Metropolitan Water District of Southern California was formed in 1928 to import Colorado River water. San Francisco secured authorization to divert water from the Tuolumne River in Yosemite National Park as early as 1913 and the formidable East (San Francisco) Bay Municipal Utility District was established in 1923 to tap the Mokelumne River: Gertrude M. Reith, "The State Water Project: Problems and Prospects", presented at the 66th Annual Meeting of the Association of American Geographers, San Francisco, California, 1970. See Fig. 1.

[224] Angel, "Aspects of the Central Valley Project", p. 92. For a complete political analysis of the referendum see Angel's chapter three, "Political Background of the Central Valley Project Act", pp. 27-93.

Pacific Gas and Electric and the citrus growers south of the Tehachapi Mountains were in strong opposition to the project.[225] This section of the state strongly defeated the measure. As would be expected the Central Valley (especially the San Joaquin portion) strongly endorsed the measure to cancel out the negative Southern California votes and supply a small winning margin. The passage was assured with the winning margin collected in the San Francisco Bay Area.[226] It is apparent the successful passage would have been jeopordized without the salinity protection measure and the Contra Costa aqueduct. Sam Yorty, in the Eagle Hearings twenty years after the election, emphasized the role salinity control played in winning the election with the statement:

> ...I recall very well the arguments relative to salinity control that we used in winning that election ...I didn't understand then that we were committing a huge amount of water for that salinity control, but I certainly remember that we promised it would be done.[227]

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[225] Ibid., p. 86.

[226] Angel states, "...the metropolitan area around San Francisco Bay really decided the election", Ibid., p. 90.

[227] U. S. 82d Cong., 1st sess. House Committee on Interior and Insular Affairs. Hearings on the Central Valley Project, California: Water Rights, Supplies, and Uses before special Subcommittee on Irrigation and Reclamation in Sacramento, Ca. (1951) p. 240.

And,

> It seems to me that it would be a fraud on the people in your [Delta] Area and on many other people who voted for the project if salinity control were now [1951] to be abandoned.[228]

State Bid for Federal Assistance

In the final years of planning and prior to the passage of the Central Valley Project Act in 1933, the state vigorously sought federal financial assistance for the state project. As early as 1930 a joint Federal-State Commission on Water Resources recommended the federal government appropriate funds in behalf of flood control and navigation.[229] Without federal assistance the project was unfeasible as the estimated revenues from sale of water and power would not cover the construction cost with the going interest rate of 4-1/2 per cent. State Engineers calculated that the annual cost would exceed the annual revenue by $2,816,000.[230] Thus, the federal government would have to assume part of the cost, or lower the interest rates, or both before the project would approach financial feasibility.[231] The revenue bonds authorized by the voters lay dormant as, without aid, the project could not generate the necessary repayment.

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[228] Ibid., p. 52.

[229] Joint Federal-State Water Resources Commission, Report to the President of the United States and the Governor of the State of California, December 27, 1930, p. 10.

[230] D. P. W. Report to the Legislature of 1931 on State Water Plan, 1930 (Bulletin No. 25, 1931), p. 49, in Hansen, CVP: Federal or State? p. 28. See also Bureau of Reclamation, Report on the Central Valley Project, unpublished report prepared by H. W. Bashore, August 25, 1933, in H. D. 416 (84:2), p. 522; WPA allotment to Interior Department, 1935 in H. D. 416 (84:2), p. 559.

Pragmatically the project was very attractive for federal assistance. The flood control and navigation benefits (long a federal function) from Kennett Dam were unquestionable. Also, the project was presented as one that would not increase acreage and add to the national problem of overproduction, but rather would save many farms from returning to desert. This point was brought out time after time in several hearings and reports.[232] The major emphasis was placed on rescuing the San Joaquin Valley farms but some attention was given to saving the Delta farm lands from the intensifying salinity incursion. It was pointed out that these highly productive lands faced a possible abandonment due to the salinity problem.[233]

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[231] Montgomery, History of Legislation and Policy Formation, pp. 75, 76.

[232] Joint Federal-State Water Resources Commission, Report, (1930) p. 9; California Governor. Report of Governor Rolph's Water Conservation Commission to President Hoover on February 24, 1931, p. 10, in Report of the Joint Committee of the Senate and Assembly Dealing with the Water Problems of the State, March 23, 1931; California Governor, Booklet of Information on California and the State Water Plan Prepared for United States House of Representatives' Subcommittee on Appropriation (1931), p. 38; California Governor, Bulletin on Great Central Valley Project of State Water Plan of California Prepared for United States Senate Committee on Irrigation and Reclamation, (1932), pp. 36-39; U. S. 74th Cong., 1st sess. House Committee on Flood Control. Hearings, Central Valley Project of California (1935), Testimony of Congressman Henry E. Stubbs (p. 29) and State Engineer Edward Hyatt (pp. 59-60).

The federal response to the state suggestions were encouraging. A subcommittee of the United States House of Representatives' Committee on Appropriations toured the Central Valley in July, 1931, to be followed by the United States Senate Committee on Irrigation and Reclamation in August of 1932. Both committees were duly impressed with the severity of the drought conditions.[234] Congressman Murphy, Chairman of the House subcommittee indicated federal participation was on the threshhold with the statement:

> During the last Legislature... I publicly announced that I would call a special session of the Legislature to pass the necessary legislation if and when the various interest and geographical divisions of the State would reconcile their differences and be able to agree upon a practicable program of development which would be fair and just to all sections of the State.[235]

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[233] California Governor. "Report of Governor Rolph's Water Conservation Commission" (1931), p. 10.

[234] Montgomery, History of Legislation and Policy Formation, p. 66. See: U. S. 72d Cong., 2d sess. Senate. Committee on Irrigation and Reclamation. Utilization of the Water Resources of the Sacramento, San Joaquin and Kern Rivers, California: Report on Investigation and Inspection Trip to Great Central Valley Project of California, pursuant to Sen. Res. 177, August 31-September 3, 1932, (1933).

[235] Letter. James Rolph, Jr., Governor of California, to the People of California, August 24, 1931 in H. D. 416 (84:2), p. 405.

Meanwhile the Army Corps of Engineers and the Bureau of Reclamation had begun low-keyed competition for participation. The Corps reported (February, 1931) the federal government would be justified in contributing six million dollars toward the construction of Kennett Reservoir.[236] The Bureau a few months later (June, 1931) indicated in the "Bissell Report" the Bureau should construct the project.[237] And a statement by Congressman Harry L. Englebright indicating the federal government should make a non-reimbursable contribution of 45 million dollars towards the project assured the state planners federal assistance was imminent.[238] The question remained, however, should the federal government contribute to the state plan and, if so, how much, or should the project be federalized? Neither question was answered by the time the State Legislature and voters enacted and approved the Central Valley Project Act of 1933.

The 1933 Act also created the state Water Project Authority to administer the Central Valley Project.[239] Even though the

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[236] U. S. 71st Cong., 3d sess. U. S. War Department. Chief of Engineers. Partial Report on Sacramento, San Joaquin and Kern Rivers, California. February, 1931.

[237] BOR, Bissell Report on Water Resources of the Great Valley of California, June, 1931, p. 8.

[238] The Sacramento Bee, December 8, 1933, p. 13. In Angel, "Aspects of the Central Valley Project", p. 82.

[239] Sec. 5.

Authority was not officially activated until the referendum vote in December (1933), it filed a preliminary application for federal assistance with the Federal Emergency Administration of Public Works on September 27, 1933.[240] And one month after the referendum was approved, the Authority sent an amended application to the Federal Emergency Administration of Public Works for approval of the Central Valley Project and reapplied on February 16, 1934.[241] The Project was investigated by the Public Works Administration but no action was taken.

In the ensuing negotiations the state clearly indicated it wanted federal assistance for a state project. At the same time, the immediate goal was the project--federal or state. This line of thought was put forth by Edward Hyatt, the State Engineer and ex officio executive officer of the Water Project Authority, in the following testimony during hearings before the House Committee on Flood Control:

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[240] California Water Project Authority. Application to Federal Emergency Administration of Public Works for Approval of Central Valley Project of California and for Grant and Loan for its Construction Under the Provisions of National Industrial Recovery Act of 1933. September 27, 1933.

[241] California Water Project Authority. Amended Application to Federal Emergency Administration of Public Works for Approval of Central Valley Project of California, January 25, 1934. Supplement to Amended Application. February 16, 1934.

> Congressman Kimball. Do you prefer that this matter be taken over and put under State control rather than have it under Federal control?
>
> Mr. Edward Hyatt. That is a secondary matter. The State wants this project before the country dries up and blows away. My personal view is that it would be handled better under State authority than it would under Federal authority.[242]

Continuing:

> Congressman Wilson. You referred to the Legislature of the State of California. Is it your view that this project should be undertaken as a Federal project with State assistance or as a State project with assistance of the Federal Government?
>
> Mr. Hyatt. That is a matter of secondary interest in California. California wants the project constructed, and if the Federal Government desires to take charge of it I am sure that the people of California will say well and good. They are desperate. Our view is that it should be done by the State, and we have filed this application with the Public Works Administration and are proceeding under the State water authority. It is believed that this is the preferable way to handle it. However, the great desire is to get the project constructed and to safeguard this country; and the Government's desires in that matter will come first.[243]

Federal Response

The federal government continued to endorse the State Plan while withholding financial commitment. The President's Committee on Water Flow, considering the ten water projects most worthy of federal assistance, ranked the California project fifth.[244] Noting the planning cost of almost $2,000,000 over a ten year period, the committee evaluated the project as, "...the most carefully considered and complete plan of its kind ever drawn up."[245] The U. S. National Resources Board also recognizing the degree of planning, commented favorably on the project.[246] All twelve federal investigations of the project, Ed Hyatt pointed out in the hearings reproduced above, endorsed the project.[247]

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[242] U. S. 74th Cong., 1st sess. House. Committee on Flood Control. Hearings CVP of SWP, (1935)p. 72.

[243] Ibid., p. 60.

With such excellent recommendations for a project that would put many of the unemployed to work without increasing acreage and compounding the problem of overproduction, it is a small mystery why the Public Works Administration did not grant funds to the state. Montgomery and Clawson express the same bewilderment,[248] but

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[244] U. S. 73d Cong., 2d sess. U. S. President's Committee on Water Flow, 'Report," in Development of Rivers of United States. House Document No. 395 (1934) pp. 5-8.

[245] Ibid., p. 332.

[246] U. S. National Resources Board, Report, December 1, 1934, p. 286. Part 3 consists of "Report of the Water Planning Committee".

[247] U. S. Cong. House. Committee on Flood Control. Hearings CVP of SWP (1935) p. 40.

[248] Montgomery, History of Legislation and Policy Formation, p. 76.

Angel lays it to a shortage of funds by the Public Works Administration.[249] As pointed out in the next chapter, federal funds for the CVP were granted to the federal Bureau of Reclamation.

In summary, this chapter has pointed out that early investigations and planning preceded the occurrence of the salinity incursion problem. However, once the incursion occured, a great deal of investigation was channeled into a solution as part of the state Central Valley Project. Only after the engineers and lawmakers were assured Kennett (Shasta) Dam could maintain salinity control, did they drop their support for a barrier. Salinity control, with an outflow of 3,300 c. f. s. at Antioch, was incorporated in the operating document (Bull. No. 25) developed by state engineers and salinity control appears in the legislative and voter approval of the project. If the CVP had become a state project, the operators would have had no choice but to maintain salinity control. As is pointed out in Chapter VII, this turn of events is of more than academic interest as the Bureau presently takes the position it does not have a commitment to salinity control.

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[249] Angel, "Aspects of the Central Valley Project," p. 95, citing California Water Project Authority, Booklet of Information for Conference Between the United States Department of Interior and the W. P. A. of the State of California, (mimeographed), Sec. IV, 1-6, August 28, 1940.

CHAPTER IV

THE FEDERAL CENTRAL VALLEY PROJECT

> The saga of this project is fascinating... The object of the plan [project] is to arrest this flow and regulate its seasonal and year-to-year variations, thereby creating salinity control to avoid the gradual encroachment of ocean water... The water supply facilities along the Sacramento River will regulate its flow, store surplus winter runoff for use in the Sacramento Valley, maintain navigation in the channel, protect the Sacramento-San Joaquin Delta from salt intrusion from the Pacific, provide a water supply for the Contra Costa and Delta -Mendota Canals, and generate a great deal of hydroelectric energy.... Moreover, the Federal Government will receive no reimbursement for that portion of the cost allocated to numerous aspects of the project, such as navigation, flood control, salinity prevention, fish and wildlife preservation, and recreation.
>
> U. S. Supreme Court, 1958
> Ivanhoe Case in H. Doc. No. 246 (85:1)

INTRODUCTION

Following a brief description of the CVP, this chapter traces the federal authorization of the project.[250] Emphasis is

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[250] Several studies were used in compiling this section but three sources merit special recognition. Montgomery and Clawson, History of Legislation and Policy Making and Angel, "Political and Administrative Aspects", are outstanding academic treatments of

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placed on salinity control as it appears from time to time in the authorization. Following, a section is devoted to the Bureau's salinity control policy formation up through 1957 when the present policy was crystalized. A final discussion briefly illustrates, in a general way, the financial status and repayment policy of the project. This provides a background for the Chapter IX discussion on the financial impact of increased salinity control releases.

DESCRIPTION OF THE PROJECT

High up in the Coastal Range, in the shadow of the Trinity Alps, Clair Engle Reservoir captures the upper Trinity River runoff. This water is diverted through a system of three reservoirs, two tunnels and four sets of turbines before it joins Shasta Reservoir

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the subject. The complexity of the project and its history prompted Representative Clair Engle, from the Sacramento Valley (Infra N. 283), to document the authorizing and operating documents of the Central Valley Project. As Chairman of the House Committee on Interior and Insular Affairs Engle prepared the information in two documents: H. D. No. 416 (84:2) presents the authorizing documents and H. D. No. 246 (85:1) presents the operating documents. Other less extensive but helpful works include: John Charles Gill, "The Politics of the Central Valley Project", (unpublished M. A. thesis, Berkeley, 1950); Merril R. Goodall, "Administration of the Central Valley Project", (unpublished M. A. thesis, Berkeley, 1942); Alice Joy Frizzell, "Some Economic and Political Aspects of Water Resource Development in Central Valley of California", unpublished M. A. thesis, Berkeley, 1949); Jack Tull Casey, "Legislative History of the Central Valley Project, 1933-1949", (unpublished Ph. D. Dissertation, Stanford University, 1949).

releases in the Sacramento River. (See fig. 1) A portion of this Sacramento River flow is diverted into the Tehama Colusa Canal and Corning Canal on the westside of the Sacramento Valley before the major flow drains into the Delta. On the American River, a major tributary of the Sacramento, Folsom and Auburn (under construction) reservoir releases further augment the CVP Delta inflow.

Some of the CVP Delta water supply is diverted into the Contra Costa Canal to supply the Contra Costa County north shore but the major export is pumplifted approximately 200 feet at the Tracy pumping plants to supply the Delta Mendota Canal. This 120 mile gravity flow canal delivers water to the Mendota Pool located on the San Joaquin River where the river emerges from the west face of the Sierra Nevada Mountains to turn northward in the San Joaquin Valley and flow to the Delta. Above the Mendota Pool Friant Dam stores the San Joaquin River flow to divert it 37 miles northward with the Madera Canal and 160 miles southward to Bakersfield with the Friant-Kern Canal. If Delta water is not delivered to the Mendota Pool in suitable quantity or quality, Friant Dam storage must be released into the San Joaquin River to supply the senior water rights along the lower river. Thus, the water conveyed through the Delta Mendota Canal is referred to as substitute or exchange water; it is exchanged for San Joaquin River water diverted into the Madera and Friant Kern canals at Friant Dam.

Various other CVP segments operate independently and/or in concert with the major facilities described above. Two that should be mentioned are the San Luis Unit and the Folsom South Canal.

Located on the westside of the San Joaquin Valley, at about midway on the Delta Mendota Canal is the joint CVP and SWP San Luis Reservoir. In the winter, water is diverted from the Delta Mendota Canal and the California Aqueduct to be pumplifted up and into the San Luis Reservoir. In the summer, this water is dropped through generators (recovering about 20 per cent of the pumping power) back into the Canal and the Aqueduct to be transported south.[251] The two projects share the California Aqueduct from the reservoir to about the Fresno-Kings County line south of the reservoir. The Bureau can deliver San Luis Reservoir water through the joint facility or the Delta Mendota Canal.

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[251] Because the winter flood flows assure salinity control, winter water stored in San Luis Reservoir is of excellent quality. This potentially gives the projects added flexibility in meeting water quality objectives. As summer diversions pass below this reservoir, in the Delta-Mendota Canal and the California Aqueduct, reservoir releases can be made at the rate necessary to blend with and upgrade the quality of the summer diversions. The project operators may have incorporated this quality maintaining function into the Delta export quality objectives in Table XVI or they may have set these objectives with no consideration for San Luis Reservoir, thus allowing for maximum flexibility. The point is, the operational flexibility exists and the reservoir was probably relied upon heavily to meet the quality and quantity requirements of the project in the post Andrus Island Flood period of 1972. See discussion Accompanying Ns. 104-107 Supra.

Just below Folsom Reservoir on the American River, the Folsom South Canal diverts water southward for about 25 miles. This facility is the first reach of the yet to be authorized CVP East Side Canal. This canal is scheduled to travel along the east side, receiving diversions from the New Melones and other CVP reservoirs, some still in the planning stage. Eventually the delivery canal will travel the full length of the San Joaquin Valley paralleling the Friant-Kern Canal.[252]

CORPS AUTHORIZATION

The Army Corps of Engineers was initially successful in securing authorization for Shasta Reservoir with the passage of the Rivers and Harbors Act of August 30, 1935.[253] Congress authorized $12,000,000 to be applied toward the construction of Shasta Dam (States' Kennet Dam) by the Corps in accordance with the plans recommended in the revised report of the Chief of Engineers on the Sacramento, San Joaquin and Kern Rivers, Rivers and Harbors Document No. 35, 73rd Congress, 2nd session, but no funds were appropriated for this purpose. The revision of the original report is of paramount importance as it deals specifically with salinity control.

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[252] To date Congress has failed to authorize this segment of the project. Ostensibly the Southern California Washington caucus will not support the project as it will not benefit their area. The Sacramento Bee, February 4, 1973, p. 1. As an alternative the BOR and DWR are planning a Mid-Valley Canal. The California Aqueduct would be used to transport water up the San Joaquin Valley. The Bureau would then divert this water over to the east side at about the Mendota Pool to deliver with one branch to Madera County and another to the Kern County line. This project must also be authorized and funded by Congress. Association of California Water Agencies, Western Water News Vol. 26, No. 9-10, September-October, 1974, p. 1.

In the initial report the Division Engineer and the Board of Engineers recommended a federal contribution of slightly more than $7,000,000 to the first cost of Shasta, but the Chief of Engineers in the revised report, overriding the recommendations of the Division Engineer, recommended a larger sum with the following justifications:

> The Federal interest in the conservation of water by the construction of the Kennett Dam largely exceeds in my opinion that evaluated by the division engineer and the Board, since by remedying the intrusion of salt water into the delta of the Sacramento and San Joaquin Rivers, it eliminates from consideration Federal participation in the construction and operation at great cost of locks and structures to pre-

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[253] U. S. 74th Cong., 1st sess., River and Harbor Act of 1935 (49 Stat. 1028, 1038), August 30, 1935. In H. Doc. No. 416 (84:2) p. 558.

> vent such intrusion, and assures a free and open passage for the highly important navigation through the channels of the delta. Based on this aspect of the case, as well as the direct benefits to navigation and flood control on the Sacramento River, I find that the general and Federal benefits from the construction of the Kennett Dam on the plans now proposed by the State warrants a special direct participation of the Federal Government of $12,000,000 in the cost of this structure.[254]

A segregation of the sum follows:[255]

Direct benefits to navigation--------	$ 5,000,000
Direct benefits to flood control (one-third of $4,100,000)---------	1,370,000
Elimination of salt water barrier----	5,630,000
	$12,000,000

It is evident from the statement by the Chief of Engineers and the breakdown by the Bureau of Reclamation that the federal nonreimbursable authorization of $12,000,000 was to cover navigation, flood control and salinity repulsion. As will be seen in Chapter IX, the full ramifications of this action have surfaced repeatedly in the continuing unresolved salinity control-repayment-maintenance controversies.

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[254] U. S. 73d Cong., 2d sess., House Committee on Rivers and Harbors, Sacramento, San Joaquin, and Kern Rivers, California. House Document No. 35 (April 6, 1934), pp. 4, 5.

[255] BOR, Central Valley Project Studies: Allocation of Cost, p. 30.

BUREAU AUTHORIZATION

Simultaneous with the Corps activities, the Bureau was also vying for the Shasta project. An application for a construction allotment of $20,000,000 was made on May 29, 1935, and on July 23, the Federal Advisory Committee on Allotments recommended an allocation of the funds, "...subject to the provisions of the Reclamation laws."[256] The competition between the Bureau and the Corps for developing the state's water resources is presented in a subsequent section.[257] Whether or not the fact that the Corps received authorization in the August 30, 1935 Rivers and Harbors Act catalyzed the Bureau and its supporters into a more active role is conjecture. However, it may be more than coincidence that four days after the passage of the Act, a series of conferences was held in California, attended by Bureau officials, including the Commissioner, Elwood Mead, and State Engineer, Edward Hyatt. Four days hence, September 10, 1935, President Roosevelt, by an Executive Order in the form of a letter addressed to the Secretary of the Treasury requested the transfer of $20 million from the appropriation made by the Emergency Relief

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[256] National Emergency Council Docket No. 1313, in Montgomery, History of Legislation, p. 81.

[257] Infra. Ns. 276, 277.

Appropriation Act of 1935 to the Reclamation Service, for the Central Valley Project "...provided that the funds hereby allocated shall be reimbursable in accordance with the reclamation laws.[258] Considering the character of the project, the President stated, "The purpose is to store and conserve flood and wastewaters of the Sacramento and San Joaquin Rivers and their tributaries so that the entire flow can be used for flood control, improvement of navigation, irrigation, the development of hydroelectric power and the protection of the delta lands at the junction of the two rivers against injury from salt."[259]

The Federal Emergency Administration of Public Works promptly sent out a press release announcing the allocation and work program. It read, in part:

> The Central Valley project, a comprehensive program for the conservation of the waters of the San Joaquin and Sacramento River Basins in Central California, was designed by the State of California and the Bureau. It contemplates eventual control of both rivers to provide supplemental water for lands in the southern end of the San Joaquin Valley that are now drying up; flood protection along the Sacramento River; prevention of encroachment of salt water in the rich river delta; a fresh water supply for the industrial cities of Suisun Bay; improvement of navigation and for generation of hydroelectric power.[260]

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[258] Franklin D. Roosevelt, U.S. President, Executive Order of September 10, 1935. In H. Doc. No. 416 (84:2), p. 559.

[259] Ibid., p. 560.

[260] Federal Emergency Administration, Press Release No. 1546, September 16, 1935, in H. Doc. No. 416 (84:2), p. 561.

The Bureau set up a project office in Sacramento and field surveys soon began. Following this action the Secretary of the Interior filed a positive feasibility report with the President on November 26, 1935 recommending construction of the Central Valley Project by the Bureau. The physical units and the estimated cost of the project were virtually the same as those in the state plan. As a matter of fact Secretary Ickes stated ten years later:

> I don't mind revealing to you that the Finding of Feasibility on the Central Valley project which I submitted on November 26 and the President approved on December 2, 1935...was prepared in draft form by State Engineer Hyatt of California with the assistance of John C. Page of the Bureau of Reclamation.[261]

Of special interest is the reference to salinity control which occurs in the section of the feasibility report dealing with the project description of Kennett (now Shasta) Reservoir:

> The key unit of the project is Kennett Reservoir on the Sacramento River... Water released from the reservoir, after generating hydroelectric power, will flow down the Sacramento River, maintaining adequate depths for navigation and furnishing ample supplies for irrigation, municipal and industrial use along the main river and in the fertile delta region of the Sacramento and San Joaquin rivers. Intrusion of salt water from the bay into the delta channels - a frequent occurrence in recent years, causing

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[261] Harold L. Ickes, U.S. Secretary of Interior, letter to Frank Caroe in San Francisco News, November 12, 1945.

> substantial loss in crops and threatening destruction of productivity - will be prevented by the released waters.[262]

And:

> Control of salinity in the delta of the two rivers near Sacramento is part of the agricultural maintenance phase of the project. Here 400,000 irrigated acres with an annual crop value of $30,000,000 are menaced by salt water from upper San Francisco Bay. Some abandonment has occurred and the whole area is endangered.[263]

In light of the fact that the 1935 Authorization, the Executive Order, Press Release and Feasibility Study all give attention to salinity control as one of the multifunctions of the federal Central Valley Project, it would appear safe to conclude the federal government had assumed the commitment established by the state. Yet, in the Congressional authorization of the project in the River and Harbor Act of 1937, salinity control is not specifically mentioned in the law. Section 2 of said Act reads:

> SEC. 2. That the $12,000,000 recommended for expenditure for a part of the Central Valley project, California, in accordance with the plans set forth in Rivers and Harbors Committee Document Numbered 35, Seventy-third Congress, and adopted and authorized by the provisions of section 1 of the Act of August 30, 1935 (49 Stat. 1028 at 1038), entitled

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[262] Harold L. Ickes, U. S. Secretary of the Interior, Feasibility Report of Secretary of the Interior, in H. Doc. No. 416 (84:2), p. 563.

[263] Ibid., p. 564.

"An Act authorizing the construction, repair, and preservation of certain public works on river and harbors, and for other purposes", shall, when appropriated, be available for expenditure in accordance with the said plans by the Secretary of the Interior instead of the Secretary of War: Provided, That the transfer of authority from the Secretary of War to the Secretary of the Interior shall not render the expenditure of this fund reimbursable under the reclamation law: Provided further, That the entire Central Valley project, California, heretofore authorized and established under the provisions of the Emergency Relief Appropriation Act of 1935 (49 Stat. 115) and the First Deficiency Appropriation Act, fiscal year 1936 (49 Stat. 1622), is hereby reauthorized and declared to be for the purposes of improving navigation, regulating the flow of the San Joaquin River and the Sacramento River, controlling floods, providing for storage and for the delivery of the stored waters thereof, for the reclamation of arid and semi-arid lands and lands of Indian Reservations, and other beneficial uses, and for the generation and sale of electric energy as a means of financially aiding and assisting such undertakings and in order to permit the full utilization of the works constructed to accomplish the aforesaid purposes: Provided further, That except as herein otherwise specifically provided, the provisions of the reclamation law, as amended, shall govern the repayment of expenditures and the construction, operation, and maintenance of the dams, canals, power plants, pumping plants, transmission lines, and incidental works deemed necessary to said entire project, and the Secretary of the Interior may enter into repayment contracts, and other necessary contracts, with State agencies, authorities, associations, persons, and corporations, either public or private, including all agencies with which contracts are authorized under the reclamation law, and may acquire by proceedings in eminent domain, or otherwise, all lands, rights-of-way, water rights, and other property necessary for said purposes: And provided further, That the said dam and reservoirs shall be used, first, for river regulation, improvement of navigation, and flood control;

> second, for irrigation and domestic uses; and, third, for power.[264]

Unless river regulation is interpreted to include salinity control, it can be argued that this function is left out of the last sentence which spells out the purpose of the project. The Bureau presently interprets the law as meaning salinity control is not an authorized function of the project.[265]

As has been pointed out earlier, Shasta Reservoir, as presented in H. Doc. No. 35 (73:2), was initially authorized as a Corps project in the River and Harbor Act of 1935. The authorization stipulated $12,000,000 of nonreimbursable funds should be allocated to navigation, flood control and the elimination of a salt water barrier. By maintaining Delta outflows, the reservoir would serve the navigation function of eliminating a barrier. Thus $5.63 of the $12 million authorization was allocated to salinity control with the maintenance of Delta outflows.

Since this authorization was not funded, it would normally just become recorded history. However, the significance of the Corps authorization was revitalized when it was carried through in the Bureau authorization by the President and the Congress.

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[264] U. S. 74th Cong., 3d sess., River and Harbor Act of 1937 (50 State. 844, 850), August 26, 1937, in H. Doc. No. 416 (84:2), p. 568.

[265] California Legislature. Senate. Senate Select Committee on Salinity Intrusion in Agricultural Soils, Intrusion of Ocean Salinity San Francisco Bay and Sacramento-San Joaquin Delta: A Progress Report to the Legislature, January 4, 1971, p. 6.

The President's transfer of funds from the Corps to the Bureau did not make specific mention of the Corps' authorization but he did state a purpose of the project was "...to store and conserve flood and waste waters...so the entire flow can be used for ... [among others] the protection of the delta lands at the junction of the two rivers against injury from salt." This seems to imply that the project was authorized by this official action to maintain salinity control. The President did stipulate "...that the funds hereby allocated shall be reimbursable in accordance with the reclamation laws." The reader should realize the question under consideration in this discussion is not repayment - that is presented in Chapter VII - but authorization of salinity control. Bureau officials at present argue that when the President placed the funds under the reclamation laws he also placed each unit and purpose under the law as well. And, they continue, the Reclamation Law does not allow for the maintenance of salinity control as a nonreimbursable function.[266]

From another point, it could be argued that the President considered salinity control a function of navigation which the Bureau is charged with maintaining. Logically, it seems unreasonable that the President would put himself in the ambivalent position of, on one hand, stating the project would maintain salinity control, and, on the other, indirectly disallowing the project to include such a purpose by placing it under the jurisdiction of the Reclamation Laws.

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[266] BOR, Responses to questions directed to the Bureau of Reclamation by letter by the State Assembly Committee on Water. September 27, 1972, presented to the California Legislature. Assembly. Assembly Committee on Water. November 9, 1972.

Salinity control is not specifically mentioned in the River and Harbor Act of 1937 in which the Bureau received full Congressional authorization for the project but the act does tie rather strongly the authorization to H. Doc. No. 35 (73:2) in the 1935 authorization. Sec. 2 in the 1937 authorization reproduced above clearly states the $12,000,000 recommended for expenditure in H. Doc. No. 35 and authorized in 1935 shall be transferred to the Secretary of the Interior instead of the Secretary of War and the sum was not to be reimbursable under the Reclamation Law. The act further enunciated this reservation from Reclamation Law with the language "... That except as herein otherwise specifically provided, the provisions of the reclamation law, as amended, shall govern the repayment... construction... operation... of the dams... ".

The act not only provided otherwise, but it specifically provided for the navigation aspects as prepared by the Corps Chief of Engineers in H. Doc. No. 35 (73:2) and adopted by the 73d Congress. Thus, it may be argued that the flood control and navigation segments of the CVP, as inherited by the Bureau, are outside the Reclamation Law. Furthermore, there is room to believe that the Congress passed the operation of the project for flood control and navigation, as contained in H. Doc. No. 35 (73:2) from the Army to the interior with the intent that these functions would remain intact. In short, as the foregoing discussion indicates, Congress directed the Bureau to maintain salinity control outside the Reclamation Law. This topic is given additional attention in Chapter IX.

SALINITY CONTROL POLICY FORMATION

Introduction

Immediately following authorization, the Bureau began designing and constructing the project, the major planning of which had been done by the state. A spirit of urgency prevailed upon the Bureau to begin construction and create jobs for the multitude of unemployed, due to the strong grip of the economic depression of the period.[267] Policy matters were to receive a significant amount of attention at a later date and in the "honeymoon" period, the Bureau continued to publicize a multipurpose-something-for-everyone project.

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[267] Montgomery and Clawson, History of Legislation, p. 129.

Initially, little attention was given to the framework in which the Bureau operates--the Reclamation Laws dating back to 1902.[268] In every respect, the federal Central Valley Project appeared to be the same as the state envisioned project, and when the differences began to surface, salinity control was greatly overshadowed by problems related to acreage limitation, distribution of public power and repayment.

The Bureau came to grip with the total spectrum of policy and management problems in 1942. Harlan H. Barrows (Department of Geography, University of Chicago) was appointed Director of the Central Valley Project Studies and a cross-section (agricultural, academic, state, federal) of participants was appointed to 24 individual problem committees. Reports on the problems were filed through the late forties, and salinity control received attention in Allocation of Cost and Payment by Beneficiaries.[269]

The subject of salinity control continued to be passive or non-existent in the project controversies until the early fifties when the Delta Mendota Canal went on line, and the Delta became the pooling place for water transfers from the Sacramento to the San Joaquin Valley. The Contra Costa Canal, serving the north shore of Contra Costa County, had been diverting water from Rock Slough in the Delta since 1940, but the small amount diverted, plus the surplus of water due to the absence of the major diversion facility, the Delta Mendota Canal, resulted in plenty of water for Delta outflows.

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[268] Act of June 17, 1902, c. 1093, 32 Stat. 388 (codified in scattered sections of 43 U. S. C. from sec. 372 through sec. 498) in Leland O. Graham, "Some Aspects of Federal-State Relationships in California Water Resources Development", unbound document, January 2, 1961, p. 5. For a background on the development and intent of the law, see Montgomery and Clawson, History of Legislation, pp. 131-144.

[269] BOR, Central Valley Project Studies: Allocation of Cost. BOR, Central Valley Project Studies: Payment by Beneficiaries, Problems 10-13, 1947. For a short synopsis of the problems see: H. Doc. No. 246 (85:1) pp. 482-486.

With the opening of the Delta Mendota, the Delta controversy began to gain momentum. When the financing for the State Water Project was approved by the citizens of the State in 1960 (Burns-Porter), the problem was multiplied many times over because this project also utilizes the Delta as a pooling place for water transfers. As early as 1961, the California Assembly, Interim Committee on Water expressed the magnitude of the problem after a cursory review of the Delta question:

> It is no overstatement to conclude that the complex problem briefly outlined above is unprecedented in California water resources development.[270]

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[270] California Legislature. Assembly. Interim Committee, The Delta Pool: A Report to the California Legislature, January 2, 1961, in Assembly Interim Committee Reports, 1959-61, Vol. 26, No. 2, p. 10.

The Bureau's current salinity control commitment represents an about-face of the early pledges and the controversy remains, to this day, unresolved. An extensive literature search was conducted for this thesis to trace the commitment through the history of the CVP. Generally, the turn around policy did not evolve gradually; it was abruptly stated in 1957.[271] The Bureau perpetrated the salinity control function of the State CVP until that time, it appears, because of its public and congressional appeal. As the demands for project water built up, however, the great amounts of water needed for salinity control could only be maintained at the expense of export water. This supply consideration plus a possible state-federal conflict over who maintains salinity control prompted the Bureau to drop the commitment. The controversy as it exists today is given further attention in Chapters VIII and IX. The purpose of this brief introduction is to establish a framework to evaluate some historical salinity control statements herein presented.

Pre-1957 Bureau Commitments

The Bureau's Central Valley Project Feasibility Study, the Executive Order and the press release alluded to in the previous section, testify to the case that salinity control was originally held in the same positive light in the federal project as that in the state envisioned project. These early commitments set the tone for a plethora of statements that followed.

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[271] See the "Spencer Letter" accompanying N. 301. Infra.

To reproduce all the Bureau's references to salinity control which have been found would detract from the original objective of the thesis and is therefore not desireable. Yet, their multitude serves as testimony and they are set forth in Table XIII. It should be emphasized that all potential sources were not reviewed and the total number of commitments is not known. From the consistency of its appearance in the historical sources read, the author feels that the number of commitments is only limited by the number of speeches, documents, reports, pamphlets and letters made by the Bureau--they are extensive.

Of equal importance to the number of salinity control statements is the degree of these commitments. In Table XIII they have been classified on an incidental purpose to extreme scale. It should be pointed out that such a ranking is subjective in nature. Generally, the extreme statements were made in the early years, and strong statements tapered off more slowly; only three were found in the post Delta-Mendota period, or after 1951. Multipurpose statements are scattered throughout, although they decrease with time.

Rather than randomly reproduce statements from Table XIII selected sources will be cited. Portions of the appropriation hearings are reproduced to recreate the strong and extreme early

TABLE XIII

PUBLICATIONS AND SPEECHES CONTAINING REFERENCES TO SALINITY CONTROL
BY FEDERAL OFFICIALS

IP	MP	S	E	Year/Reference	Nature of Reference	Source	Page
				1935			
	2			President Franklin D. Roosevelt	Executive Order of September 10	Engle, H. Doc. 416, 84th Cong., 2nd Sess.	559, 560
	1			Federal Emergency Administration of Public Works	PWA Press Release No. 1546	Engle, H. Doc. 416, 84th Cong., 2nd Sess.	561
		1	1	Secretary of Interior Harold L. Ickes	CVP Finding of Feasibility	Engle, H. Doc. 416, 84th Cong., 2nd Sess.	563, 566 - 567
				1936			
		1		Bureau Commissioner John C. Page	Testimony, Appropriation Hearings	U.S. Congress. House. Committee on Appropriations, Interior Department Appropriation Bill, 1937. Supplemental Hearings on House of Representatives 10630 and Senate Amendment 54, 74th Cong., 2nd Sess.	77
				1937			
5	2	1		Bureau Commissioner John C. Page	Testimony, Appropriation Hearings	U.S. Congress. House. Committee on Appropriations. Hearings, Interior Department Appropriation Bill for 1938. 75th Cong., 1st Sess.	279, 282, 283, 284, 284, 288, 288, 291
				1938			
			1	Commissioner Page	Testimony, Appropriation Hearings	U.S. Congress. House. Committee on Appropriations. Hearings, Interior Department Appropriation Bill for 1939. 75th Cong., 3rd Sess.	93
				1939			
	1		2	Commissioner Page	Testimony, Appropriation Hearings	U.S. Congress. House. Committee on Appropriations. Hearings, Interior Department Appropriation Bill for 1940. 76th Cong., 1st Sess.	418, 419, 427
				1940			
	1		2	Commissioner Page	Testimony, Appropriation Hearings	U.S. Congress. House. Committee on Appropriations. Hearings, Interior Department Appropriation Bill for 1941. 76th Cong., 2nd Sess.	491, 491, 496 - 497
				1941			
	1	1	1	Commissioner Page	Testimony, Appropriation Hearings	U.S. Congress. House. Committee on Appropriations. Hearings, Interior Department Appropriation Bill for 1942. 77th Cong., 1st Sess.	736, 736, 740

Key:

IP - Incidental purpose
MP - Multi-purpose
S - Strong statement
E - Extreme

TABLE XIII--Continued

IP	MP	S	E	Year/Reference	Nature of Reference	Source	Page
				1942			
1	1			Commissioner Page	Testimony, Appropriation Hearings	U.S. Congress. House. Committee on Appropriations. Hearings, Interior Department Appropriation Bill for 1943. 77th Cong., 2nd Sess.	439, 440
				1943			
		1		H. Doc. No. 180, 78th Cong., 1st Sess.	Inserted in the Appropriation Hearings	U.S. Congress. House. Committee on Appropriations. Hearings, Interior Department Appropriation Bill for 1944. 78th Cong., 1st Sess.	1172
				1944			
		1		Commissioner H. W. Bayshore	Testimony, Appropriation Hearings	U.S. Congress. House. Committee on Appropriations. Hearings, Interior Department Appropriation Bill for 1945. 78th Cong., 2nd Sess.	645
	1			Regional Director Charles E. Carey	Testimony, Appropriation Hearings	U.S. Congress. House. Committee on Appropriations. Hearings, Interior Department Appropriation Bill for 1945. 78th Cong., 2nd Sess.	657
	2	1		Bureau official William E. Warne	Testimony, Appropriation Hearings	U.S. Congress. House. Committee on Appropriations. Hearings, Interior Department Appropriation Bill for 1945. 78th Cong., 2nd Sess.	722, 722, 725
	2			Regional Director Carey	Letter	To M. Harry Barnes, Chairman, Central Valley Project Committee, Irrigation Districts Association of California, July 18, 1944	Passim
				1945			
				1946			
2	1			Secretary of Interior J. A. Krug	Letter	W. P. Rowe, Member State Water Rights Board, opinion concurring in part with and dissenting in part from Decision 990, February 9, 1961	39, 39, 39
				1947			
	1			Bureau official Kenneth Markwell	Testimony, Appropriation Hearings	U.S. Congress. House. Committee on Appropriations. Hearings, Interior Department Appropriation Bill for 1948	778
1	3			Acting Commissioner William E. Warne	House Document prepared by Bureau; transmittal letter to President Truman	H. Doc. No. 146, 80th Cong., 1st Sess.	2, 3, 7, 10
				1948			
1				BOR official Thomas, Region 2 (Sacramento)	Testimony, Appropriation Hearings	U.S. Congress. House. Committee on Appropriations. Hearings, Interior Department Appropriation Bill for 1949. 80th Cong., 2nd Sess.	1276
	1			Commissioner Straus	Testimony	U.S. Congress. House. Hearings on H.R. 3123, 80th Cong., 1st Sess. in Engle, H.D. 246	23

TABLE XIII-Continued

IP	MP	S	E	Year/Reference	Nature of Reference	Source	Page
				1948 (continued)			
	1			Secretary of Interior Krug	Letter to Chairman of House Committee on Public Lands, February 3, 1948.	U.S. Congress. House. Committee on Public Lands. Hearings on H. R. 4152, March, 1948	5
		1		BOR et al.	CVP studies	Central Valley Project Studies, Payments by Beneficiaries Problems 10 - 13. November 29, 1948	4
				1949			
	1			Commissioner Straus	Testimony, Appropriation Hearings	U.S. Congress. House. Committee on Appropriations. Hearings, Interior Department Appropriation Bill for 1950, 81st Cong., 1st Sess.	842
		1		BOR	House Report 241 prepared for H. R. 165 (Folsom Reservoir)	U.S. Congress. House. House Report 241, 81st Cong., 1st Sess.	3
		1		Secretary of Interior Krug	Letter to Speaker of the House Sam Rayburn	Congressional Record. Appendix, Vol. 95, Part 16, 81st Cong., 1st Sess.	A5768
		1		Secretary of Interior Krug	"Letter of transmittal" to President of Senate, August 29, 1948	U.S. Congress. Senate. Our Rivers: Total Use for Greater Wealth, Central Valley Basin, S. Doc. 113, 81st Cong., 2nd Sess.	3
	1			Acting Commissioner Markwell	"Letter of transmittal" to Secretary of Interior, July 26, 1948	U. S. Congress. Senate. Our Rivers: Total Use for Greater Wealth, Central Valley Basin, S. Doc. 113, 81st Cong., 2nd Sess.	16
	4	3		Regional Director R. L. Bloke	"Letter of transmittal" to Commissioner, December 1, 1947	U.S. Congress. Senate. Our Rivers: Total Use for Greater Wealth, Central Valley Basin, S. Doc. 113, 81st Cong., 1st Sess.	28, 31, 32, 34, 34, 36, 37
	1			Commissioner Bayshore	Proposed Report of Secretary of Interior, November 9, 1945	U.S. Congress. Senate. Our Rivers: Total Use for Greater Wealth, Central Valley Basin, S. Doc. 113, 81 st Cong., 2nd Sess.	51
	4	4		Regional Director Bloke	Regional Director's Report, 1945	U.S. Congress. Senate. Our Rivers: Total Use for Greater Wealth, Central Valley Basin, S. Doc. 113, 81st Cong., 2nd Sess.	55, 58, 58, 58, 60, 60, 61, 63
2	14	10		BOR	Text	U.S. Congress. Senate. Our Rivers: Total Use for Greater Wealth, Central Valley Basin, S. Doc. 113, 81st Cong., 1st Sess.	75, 77, 78, 79, 89, 92, 93, 93, 93, 108, 109, 110, 110, 112, 113, 114, 121, 122, 122, 125, 125, 125, 201, 201, 211, 212
				1950			
	1			Prepared statement	Testimony, Appropriation Hearings	U.S. Congress. House. Committee on Appropriations. Hearings, Interior Department Appropriation Bill for 1951, 81st Cong., 2nd Sess.	696
	1			BOR	Pamphlet	Shasta Dam	
	1			BOR	Document	U.S. Congress. House. H. Doc. 367, Sacramento-San Joaquin Basin Streams, California, 81st Cong., 1st Sess.	114

TABLE XIII--Continued

IP	MP	S	E	Year/Reference	Nature of Reference	Source	Page
				1951			
	1			Acting Commissioner Goodrich W. Lineweaver	Appropriation Hearings	U.S. Congress. House. Committee on Appropriations. Hearings, Interior Department Appropriation Bill for 1952. 82nd Cong., 1st Sess.	766
	1	1		Chief Counsel Leland O. Graham, BOR, Region 11	Testimony in Hearings	U.S. Congress. House. Committee on Interior and Insular Affairs, Special Subcommittee on Irrigation and Reclamation. Hearings, Central Valley Project, California: Water Rights, Supplies, and Uses. October, 1951	23, 29
	1	1		Regional Water Rights Engineer Leland H. Hill	Testimony in Hearings	U.S. Congress. House. Committee on Interior and Insular Affairs, Special Subcommittee on Irrigation and Reclamation. Hearings, Central Valley Project, California: Water Rights, Supplies, and Uses. October, 1951	77, 93
	2			BOR	Annual Report	Annual Report of Central Valley Project, 1951	5, 14
	1			BOR	Pamphlet	Working Water for California's Central Valley, March, 1951	14
				1952			
	1			Acting Commissioner Lineweaver	Prepared Statement	U.S. Congress. House. Committee on Appropriations. Hearings, Interior Department Appropriation Bill for 1953. 82nd Cong., 2nd Sess.	1153
	1	1		CVP Superintendent of Operations Marvin Blote	Testimony and cross-examination before Assembly Interim Committee on Conservation, Planning, and Public Works, January, 1952	Assembly Interim Committee Interim Report to the California Legislature, March, 1952	14, 21
	2			BOR	Annual Report	Annual Report of Central Valley Project, 1952	19, 22
				1953			
	2			Acting Commissioner Lineweaver	Prepared Statement	U.S. Congress. House. Committee on Appropriations. Hearings, Interior Department Appropriation Bill for 1954. 83rd Cong., 1st Sess., March	1181, 1233
	1			BOR	Folsom Reservoir Project Report	U.S. Congress. Senate. Senate Doc. 73, 83rd Cong., 1st Sess., 1953	5
				1954			
	1			Regional Director Clyde H. Spencer	Congressional Testimony for Trinity River Appropriation	U.S. Congress. House. Committee on Irrigation and Reclamation, Subcommittee on Irrigation and Reclamation, Hearings on H.R. 123, April 16, 1954	3
	1			BOR	Annual Report	Annual Report of Central Valley Project, 1954	11
				1955			
	3			Regional Director Spencer	Testimony, Trinity River Division	U.S. Congress. House. Committee on Irrigation and Reclamation, Subcommittee on Irrigation and Reclamation, Hearings on H.R. 4663, April 13 - 15, 1955	8, 15, 28

TABLE XIII--Continued

IP	MP	S	E	Year/Reference	Nature of Reference	Source	Page
				1956			
	1			Regional Director Spencer	Congressional Testimony	U.S. Congress. Senate. Committee on Interior and Insular Affairs, Subcommittee on Irrigation and Reclamation. Hearings on Senate Doc. 178	84
				1957			
	4			BOR	Brochure	"Central Valley Project, California," 1957	
				BOR	Annual Report	Annual Report of Central Valley Project, 1957	7
	1			BOR et al.	Understanding prior to cooperative studies on CVP operation studies	BOR, DWR, "Sacramento Valley Water Users Committee, Memorandum of Understanding," in Engle, H. Doc. 246	627
				BOR et al.	Operation studies	Report on 1956 Cooperative Study Program Water Use and Water Rights Along Sacramento River and in Sacramento-San Joaquin Delta, March, 1957, Vol. 1	27
				1958			
				Chief of BOR Irrigation Division W. I. Palmer	Testimony in Hearings	U.S. Congress. House. Committee on Appropriations. Hearings, Interior Department Appropriation Bill for 1959. 85th Cong., 2nd Sess.	544
	1			BOR	Brochure	"Dams for Reclamation," 1958	31
				1959			
				1960			
				1961			
	1			Acting Commissioner N. B. Bennett	Letter to Secretary of Interior, December 14, 1961	U.S. Congress. House. H. Doc. 305, 87th Cong., 2nd Sess.	XII
	3			BOR	Auburn Reservoir	Reclamation Project Data (1961)	92, 93, 99
				1973			
	1			BOR	Annual Report	"Central Valley Project 1972" (circa 1973)	3
12	79	31	7	Total			
			129	Grand Total			

commitments, and Senate Document No. 113 is examined as it is the first comprehensive federal Central Valley Project planning document.[272] Excerpts from the Engle hearing in 1951 are reproduced as they clearly illustrate a confession by the Bureau that salinity control is necessary to transfer high quality water across the Delta to the Tracy pumps for the Delta Mendota Canal. Finally, testimony by BOR Regional Director G. H. Spencer before Congress on the Trinity Division Authorization Hearings in 1955 will be examined. The testimony differs significantly from that contained in the historical Spencer letter of 1957.

Appropriation Hearings

In the first appropriation hearing for 1937, Commissioner Page was asked (p. 77) to justify a planned 800,000 acre service area for the CVP. He replied:

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[272] The Reclamation Project Act of 1939, a major overhaul and supplement to the 1902 Act, required the Bureau to submit to Congress a report on the engineering feasibility of the project, estimated total cost, and the proper allocation cost. The Bureau prepared and submitted Central Valley Project of California: Allocation of Cost and Feasibility Report bound as U. S. 80th Cong., 1st sess., House Document No. 146 (1947). This document is comprehensive but not on the order of, Central Valley Basin: A Comprehensive Report on the Water and Related Resources of the Central Valley Basin, for Irrigation, Power Production, and Other Beneficial Uses in California, and Comments by the State of California and Federal Agencies bound as U. S. 81st Cong., 1st sess., Senate Document No. 113 (1949). Much of the wordage in the two documents is interchangeable. Senate Document 113 is further discussed in text accompanying N. 277 *Supra*.

> Eight hundred thousand is the total area which will be benefited by this project, by a stabilization of the water supply, and by the prevention of saline encroachment on the Delta lands at the mouth of the river, where the control of floods in the Sacramento River will prevent the encroachment of salt water into the Delta lands and thus make them capable of production, and maintain their fertility, even though there is no irrigation connected with it.

Further testimony was provided by California Representatives, Frank Buck and Harry Englebright (p. 95); Mr. Englebright's is more pronounced:

> The Delta is threatened with agricultural extinction by the recurrent invasion of salt water from the Pacific Ocean through the San Francisco Bay... Wholesale abandonment of extensive areas must result if the invasion of salt water is not stopped.

The over-zealism of Mr. Englebright's extreme statement showed through with the term "wholesale abandonment". Crop loss in the Delta from 1927 to 1942 varied from none to 5.28 per cent of the potential crop value in 1931. The average of the annual per cent loss for these years was .82.[273] These years were all pre-Shasta and they include the driest cycle and driest years on record.[274] Nevertheless, Commissioner Page seized upon Mr. Englebright's rhetoric in the 1937 (for 1938) hearings, in describing (p. 279) the purpose of the project to justify a $15,000,000 request. He said.

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[273] See Table XII in Chapter II.

[274] See Table XXII in Chapter IX.

> The purpose of the project is to store and conserve flood and wastewaters of the Sacramento and San Joaquin Rivers and their tributaries, thus controlling floods and using the regulated flow for navigation, irrigation, hydroelectric power development, and protection from salt water intrusion into the Delta region... Wholesale abandonment must result if the salt water invasion is not stopped.

A cross examination by two committee members enabled Commissioner Page to fortify the salinity control concept (p. 284). It is herein produced:

> Mr. Leavy. Is this salty condition of the water or the land one that is progressive in its nature constantly growing worse?
>
> Mr. Page. Oh, yes; the area is growing at the rate of about 20,000 acres a year. More than that.
>
> Mr. Leavy. What happens to a farm when the water there becomes salt or when its water supply is cut off?
>
> Mr. Page. It goes back to desert, and there is no production on it whatsoever.
>
> Mr. Leavy. Will a single flood of salt water on a field destroy the field?
>
> Mr. Page. Yes, almost entirely.

And Mr. Scrugham (p. 288):

> Mr. Scrugham. Is the factor of the backing-up of the salt water and the tides of the Sacramento River, and the adverse effect of that on lands in the lower Sacramento Valley a feature of this Central Valley Project?

> Mr. Page. Yes, sir. By regulation of the flow of the Sacramento River, the project will prevent the encroachment of salt water on about 400,000 acres of the delta lands... Saline encroachment is a very grave problem in the Delta section, and its prevention is to be one of the big benefits of the Central Valley Project.

In the hearings for the next appropriation (1938 for 1939), Bureau Commissioner Page was questioned as to whether or not there was need to hasten the project (p. 93). He seized the opportunity to reply:

> Perhaps I should stress two other factors. One is the encroachment of salt water in the Delta territory due to the lack of fresh water during the low flow of the river, which is seriously affecting about 400,000 acres of that rich Delta land, which is planted with asparagus, rice and things of that kind.

Rice is not well-suited for the Delta and the while the entire area has never been seriously affected by salinity incursions - a portion was definitely threatened. Commissioner Page used the "wholesale abandonment" phrase in the next hearing (1939 for 1940), in addition to other strong statements.

The gravity of his proclamations did not weaken in 1940. "Wholesale abandonment must result if the salt water invasion is not stopped", reappears (p. 491) as well as in a cross-examination from Congressman Leavy (pp. 496-497) who indicated a similar concern in the 1937 (for 1938) hearings. The dialogue includes:

> Mr. Leavy. Mr. Page, how many acres of land are affected there that would perhaps be abandoned

> and left to waste if this is not carried through?
>
> Mr. Page. There are two major areas which are in danger. One is the south San Joaquin Basin, where there are probably 400,000 acres or more that are threatened with destruction by the encroachment of salt water in their wells. The second is 400,000 acres in the Delta in which salt water from the ocean is continually encroaching on the territory and forcing the abandonment of some of it.

The pattern was thus firmly established by the Commissioner of the Bureau, salinity control was a primary purpose of the Central Valley Project. It was not, in these early years, a by-product or incidental benefit; it was, as the Commissioner displayed it to Congress, an urgent reason for the construction of Shasta Reservoir.

In 1941 Mr. Page returned to Congress with his pressing message. Previous "wholesale abandonment" terminology was replaced with... "The blight of salinity is upon their land" (p. 736). And when the sedulous Mr. Leavy asked him again about the acreage that would benefit from the project, Commissioner Page replied (p. 140):

> About 800,000 acres of irrigated land in the San Joaquin Valley and in addition it will protect about 400,000 acres from the encroachment of salt in the Delta territory.

In the following hearings, Commissioner Page softened his testimony significantly. Shasta Reservoir was on its way to completion (1944) and attention was turned to the delivery systems.

Whether or not the Commissioner needed the Delta to sell the project to Congress is conjectural. It may be possible that Page became sufficiently familiar with Delta hydrology and historical incursions to realize his degree of overstatement. This seems unlikely; one would think he would thoroughly school himself or his Sacramento staff would correctly advise him on all aspects of the project before testimony. Be that as it may, the following testimony (p. 440) differs somewhat from that previously presented:

> ...The release of water from Shasta will serve also to cut down the encroachment of salt water in the Delta area and provide an opportunity for diverting some Sacramento River water upstream to the San Joaquin Valley.

In 1943, House Document No. 180 (78:1) was inserted in the hearings but in the 1944 (for 1945) appropriation hearings, Commissioner Bashore included the following statement (p. 645) under purpose and general plan as part of the justification for expenses:

> Purpose and general plan. The project is designed to improve navigation, provide flood control, generate electrical energy, provide fresh water to cities and industries, and save rich lands from salt water intrusion threatened to destroy the productiveness of the lands. Water released from Shasta Reservoir will be supplied to lands in the Sacramento San Joaquin Delta for irrigation, industrial and municipal use, and for flushing out salt water.

William E. Warne, a Bureau official from Sacramento added the following (p. 725), in part:

> ULTIMATE BENEFITS FROM THE PROJECT
>
> Irrigation.
>
> Power.
>
> Salinity Control. Regulated releases from Shasta Dam will combat salinity intrusion from San Francisco Bay, which has ruined large acreages of highly productive land in the Delta region and threatens a total of 400,000 acres.

Shasta Dam was completed in 1944 and the commitments before the appropriations subcommittee tapered off. A few multipurpose as well as incidental statements were still recorded. In 1948 (for 1949) a Bureau engineer, explaining (p. 1276) a request for the Delta Cross channel, a system of improved sloughs, testified that the project was incidental to agriculture in the Delta. "The main purpose is to insure that water of proper quality will be available at the Tracy pumping plant. One other enlightening Bureau testimony made to the Congress should be reproduced. It is by Clyde H. Spence, Regional Director for the Bureau in 1955, when he was seeking congressional authorization of the Trinity Division of the CVP. He had this to say:

> In addition to the important San Joaquin Valley irrigation service, the initially authorized features of the project make possible a large amount of new irrigation in the Sacramento Valley, improve navigation, along the Sacramento River, control floods, and hold ocean salinity back from the delta area.
>
> ...An acre-foot of water released through Keswick Dam will serve irrigation, salinity,

navigation, and fishery purposes whether it comes from Shasta or Trinity Reservoirs; however, the acre-foot will develop over three times as much power if it runs through the Trinity plants as it will if it runs through the Shasta plants.

Rep. Sisk. Mr. Spencer, this Trinity Project, as I understand it, is simply another feature in the Central Valley project. Is that not right?

Mr. Spencer. That is correct. It is another unit.

Rep. Sisk. And those overall projects, of course, are predicated upon the complete integration of water and irrigation, as well as power; is that not correct?

Mr. Spencer. Well, it is a multiple-purpose project. It includes not only irrigation and power, but flood control and salinity control by repelling the saline waters that come in from the San Francisco Bay at low water to the delta and Sacramento. And part of our operation criteria is to keep enough water flowing out into the bay to keep the salt water from coming into the delta, which might damage up to several hundred thousand acres of land along the delta that lies between Sacramento and Suisun Bay.

Rep. Sisk. In other words, I should have added in my statement that it also includes flood control and salinity control. In other words, it is a truly integrated plan where each project to some extent relies upon the other?

Mr. Spencer. That is correct,...[275]

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[275] U. S. 83d Cong., 2d sess. House. Committee on Interior and Insular Affairs. Hearings on H. R. 4663 before the Subcommittee on Irrigation and Reclamation (1955) pp. 8, 15, 28.

Senate Document 113

Competition between the Bureau and the Corps of Engineers for projects has been illustrated with the authorization of Shasta Dam. Other reservoirs also have been sought competitively by the two agencies. Generally, the Bureau builds multipurpose reservoirs which have irrigation as their major benefit while the Corps constructs those justified primarily as flood control projects. Often in their proposal justifications the two agencies do not allocate the benefits in equal proportions. The Corps is apt to over emphasize the flood control benefits while the Bureau will favor the irrigation considerations. The agencies competing for projects have provided some embarrassment to the Executive branch of the Government to which both belong.[276]

In 1945 a major attempt was made by President Truman to coordinate the activities of the two agencies. He directed each to prepare long range programs for the Central Valley Basin with statements of the differences as to physical works and policies. These were presented to the President in 1949.[277]

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[276] The classic study dealing with this completion is The Kings River Project by Arthur Maass. Congress generally favors Corps projects with no acreage limitation or antispeculation clauses which prove to be popular with district constituents. The President, who views such matters more objectively, favors the Bureau with the Reclamation Laws requiring the limitations. Thus it is often Congress and the Corps vs. the Bureau and the President. The President told the Corps to back away from the Kings River Project, but they defied their Commander-in-Chief and built the project anyway. ICP Case Series: CPAC Number 12, Bobbs-Merrill Company, Inc., 1952. In April 1976 the U.S. Court of Appeals for the Ninth District reversed the District Court in Fresno on U.S. vs. Tulare Lake Canal Co. citing the 1944 Flood Control Act; the three judge panel unanimously ruled acreage limitation applies to projects built bu the Corps.

Four years in the making, the Bureau's report was as comprehensive as its title: *Central Valley Basin: A Comprehensive Report on the Development of the Water and Related Resources of the Central Valley Basin for Irrigation, Power Production, and Other Beneficial Users in California, and Comments by the State of California and Federal Agencies*. It was bound as Senate Document No. 113 (81:1) (1949), and it contains 44 Bureau references to salinity control.

The commitments are very convincing. The State of California's review of the project are contained on pages 309-431. A few excerpts are reproduced:

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[277] H. D. No. 416 (85:1), p. 13. Truman devised the "Folsom Formula" whereby the Corps may build the irrigation dams and the Bureau operates them. The Corps prescribes flood control operation procedure and, in times of extremely high water, the Corps takes over the project. The Formula has been somewhat successful in reducing controversy, as witnessed by the New Melones Project, now under construction with the formula. A small tributary on the Sacramento, Cottonwood Creek, is the site of a Corps-authorized but not funded project. A past District Engineer, Col. Donovan, explained the 173 million dollar project to a symposium at Chico State College in 1971. The primary economic benefit Col. Donovan pointed out (71 per cent) is the water it will conserve for the market. The author asked why then is the project not a Bureau project. The Colonel stated the water was to be sold to the State Water Project, the major customers of which are municipal and industrial users. It was pointed out that over half of the SWP water is used for agriculture. Clearly, the competition still exists.

Page 314:

> It is stated in the report under review that the features of the plan outlined herein would make water available for--
>
> '. . . (b) 360,000 acres of land in the Sacramento-San Joaquin delta needing protection from detrimental intrusion of salt water from the San Francisco Bay; . . . '

Page 326:

> Salinity-Control Requirements.
>
> The water required to control saline incursions into the Sacramento-San Joaquin Delta is another important use of water. The requirement for this purpose in both the State water plan and in the Bureau's report is based on studies presented in Bulletin No. 27 of the Division of Water Resources and the allowance for this purpose is 3,300 second-feet flow throughout the year into Suisun Bay.

The State concluded (on page 331) the construction of all authorized projects should be constructed to ". . . meet the immediate and urgent need for [among others] . . . salinity control. . . "

In discussing the differences contained in the State's comments, the Bureau Commissioner organized his presentation under three subheadings: Differences Relating to Physical Plan; Differences Relating to Engineering Approach; and Differences on Policy Matters. Salinity control is not mentioned or alluded to anywhere in the discussion. Thus, [illegible] silence may be interpreted as a tacit admission--salinity control was at this time a function of the project.

The question of the degree of salinity control is related to minimum outflows. When the State engineers approached the problem in the formulation of the State Water Plan in the planning decade, it was determined a Delta outflow of 3,300 second-feet would hold the quality to 1,000 parts chloride to one million parts water at Antioch, thus ensuring a quality sufficient for irrigation in the Delta.[278]

Preceding Bureau statements unequivocally pledged the project to the protection of the Delta but a quantified statement was not found. Excerpts from S. D. No. 113 use the 3,300 second-feet figure but they are often cautiously worded. For example, consider the following (p. 77):

> A minimum outflow to the ocean of 3,300 second-feet, equivalent to 2,400,000 acre-feet per year, will be required to protect the Sacramento-San Joaquin Delta from salinity intrusions of ocean water.

And on page 201:

> One of the principal objectives of the authorized Central Valley project is to protect the Sacramento-San Joaquin Delta from the intrusion of salt water. It is explained in Chapter III, Water Resources and Their Utilization, relief for the delta is expected to be accomplished by maintaining a minimum flow of 3,300 second-feet at Antioch through operation of Shasta Reservoir.

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[278] Div. W. R., *State Water Plan*, Bull. No. 25, p. 79. See the discussion accompanying Ns. 110-111. *Supra*.

Admittedly, the forestated appears to be sufficiently forceful to assure even the strongest doubter. However, the wording is subtly different from, for example, "Shasta Reservoir is maintaining an outflow of 3,300 second-feet," or "Shasta Reservoir will continue to maintain an outflow of 3,300 second-feet." These types of statements were not found. Nevertheless, other statements scattered through the document equate the 3,300 second-feet flow to 2.4 M. A. F. per year and a table listing project water requirements reproduces the 2.4 M. A. F. figure. The table, appearing four times in the document, is reproduced below.[279]

Purpose	Annual net use of water in acre-feet	
	Historical use (*) (average 1928-34)	Ultimate requirement, including historical
Irrigation................	[1] 7,450,000	[2]16,600,000
Outflow for salinity repulsion...............	1,900,000	2,400,000
Municipal and miscellaneous uses	250,000	550,000
Export to San Francisco Bay Area...............	50,000	450,000
	9,500,000	20,000,000

[1] For irrigation of an average of 2,970,000 acres.
[2] For irrigation of 6,580,000 acres on the average.
(*)From 1928 to 34 a series of critically dry years occurred and this column represents the belt-tightening that would occur if the cycle when repeated. See Table XXII.

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[279] Sen. Doc. No. 113 (81:1) pp. 34, 60, 77, and 110.

In these early years 60 to 70 per cent of the project water (including that used for salinity control) was made up of natural flows.[280] Also, the pumps alter the Delta hydrology so that the outflow necessary to protect the quality of the export water is much greater than 3,300 c.f.s.[281]

Public Reaction

The net result of the multitude of salinity control commitments, was to invoke a strong feeling through the state that the Bureau had assumed the state's salinity control commitment, hand-in-glove, with the takeover of the project. Table XIV contains over 80 instances in which Congress, California Legislators, several private and state officials and the U.S. Supreme Court (in litigation not related to the Delta) state salinity control is a function of the project.[282]

Evidence for the strong public belief in the Bureau's commitment to salinity control is also found in the 1951 Engle Hearings. Clair Engle served 21 years in Congress, 16 years as a Represent-

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[280] U.S. Cong. House Committee on Interior and Insular Affairs. Hearings on CVP: Rights, Supplies, Uses. p. 77.

[281] See Fig. 11 in Chapter VI. Infra.

[282] See the introduction to this chapter for the statement in the U.S. Supreme Court's Ivanhoe decision.

TABLE XIV

ACKNOWLEDGMENTS BY OTHERS OF THE BUREAU'S CVP SALINITY CONTROL COMMITMENTS

IP	MP	S	E	Year/Reference	Nature of Reference	Source	Page
				1936			
		1		Representative Frank H. Buck	Statement	U.S. Congress. House. Committee on Appropriations, Interior Department Appropriation Bill for 1932. Hearings, Supplemental Hearings on H.R. 10630 and Senate Amendment 54. 74th Cong., 2nd Sess.	93
			1	Representative Harry L. Englebright	Statement	U.S. Congress. House. Committee on Appropriations, Interior Department Appropriation Bill for 1932. Hearings, Supplemental Hearings on H.R. 10630 and Senate Amendment 54. 74th Cong., 2nd Sess.	95
				1937			
	1			Representative Englebright	Statement	U.S. Congress. House. Committee on Appropriations, Interior Department Appropriation Bill for 1938. Hearings, 75th Cong., 1st Sess.	1610
		1		Representative Buck	Statement	U.S. Congress. House. Committee on Appropriations, Interior Department Appropriation Bill for 1938. Hearings, 75th Cong., 1st Sess.	1604
	1			Representative Bertrand W. Gearhart	Statement	U.S. Congress. House. Committee on Appropriations, Interior Department Appropriation Bill for 1938. Hearings, 75th Cong., 1st Sess.	1613
				1938			
				1939			
				1940			
	1			Representative Clarence F. Lea	Testimony	U.S. Congress. House. Committee on Appropriations, Interior Department Appropriation Bill for 1971. Hearings, 75th Cong., 1st Sess.	1295
				1941			
				1942			
				1943			
	2		1	Legislature	Report	California Legislature, Joint Committee on Water Problems, Report to the Legislature on the Water Problems of the State of California, April 30, 1943	14, 45, 48
		1		California Farm Bureau Federation	In a resolution dealing with acreage limitation	Montgomery, Policy Formation of CVP	159

TABLE XIV - Continued

IP	MP	S	E	Year/Reference	Nature of Reference	Source	Page
				1944			
	1	1		District Engineer, U.S. Army Corps of Engineers	Document	Sacramento River and Tributaries, California, From Collinsville to Shasta Dam. H. Doc. 649, 78th Cong., 2nd Sess., May, 1944.	27, 46
				1945			
	1			Division of Water Resources	Annual Bulletin	Report of the Sacramento-San Joaquin Supervisor for 1944, Bull. No. 23-44, June, 1945	6-7
	2	1		California Chamber of Commerce	Bulletin	Montgomery, Policy Formation of the CVP	118, 119, 120
				1946			
	1			Division of Water Resources	Annual Bulletin	Report of the Sacramento-San Joaquin Supervisor for 1945, Bull. No. 23-45, June, 1946.	20
				1947			
	1			Division of Water Resources	Annual Bulletin	Report of the Sacramento-San Joaquin Supervisor for 1946, Bull. No. 23-46, June, 1947	20
	1	3		U.S. Senator Sheridan Downey	Book	They Would Rule the Valley (San Francisco)	200, 201, 201 202
				1948			
	1			Division of Water Resources	Annual Bulletin	Report of the Sacramento-San Joaquin Supervisor for 1947, Bull. No. 23-47, June, 1948	20
				1949			
	1			Division of Water Resources	Annual Bulletin	Report of the Sacramento-San Joaquin Supervisor for 1948, Bull. No. 23-48, May, 1949	21
	1			Representative Helen G. Douglas		Appendix to the Congressional Record, Vol. 95, Part 16, 81st Cong., 1st Sess.	A5767
	1			U.S. Geological Survey	Report commenting on and appearing in Sen. Doc. 113	U.S. Congress. Senate. Our Rivers: Total Use for Greater Wealth, Central Valley Basin, Sen. Doc. 113, 81st Cong., 2nd Sess., August	232, 234
	1			Federal Power Commission	Report commenting on and appearing in Sen. Doc. 113	U.S. Congress. Senate. Our Rivers: Total Use for Greater Wealth, Central Valley Basin, Sen. Doc. 113, 81st Cong., 2nd Sess., August	287
3	6	4		State of California	Report commenting on and appearing in Sen. Doc. 113	U.S. Congress. Senate. Our Rivers: Total Use for Greater Wealth, Central Valley Basin, Sen. Doc. 113, 81st Cong., 2nd Sess., August	314, 314, 316, 317, 335, 323, 325, 326, 326, 328, 329, 331, 332, 418, 418
				1950			
	2			President's Water Resource Policy Commission	Document	Report of the President's Water Resources Policy Commission (Washington, D.C., 1950), Volume 2	23
	1			Division of Water Resources	Annual Bulletin	Report of the Sacramento-San Joaquin Supervisor for 1949, Bull. No. 23-49, June, 1950	23

TABLE XIV-Continued

IP	MP	S	E	Year/Reference	Nature of Reference	Source	Page
				1950 (continued)			
				U.S. Supreme Court	Litigation not related to the Delta	U.S. v. Gerlach Livestock Co., 339 U.S. 725, in Engle, H. Doc. 246	709
				1951			
	1			Division of Water Resources	Annual Bulletin	Report of the Sacramento-San Joaquin Supervisor for 1950, Bull. No. 23-50., October, 1951	21
	3			Representative Clair Engle	Statement	U.S. Congress. House. Committee on Interior and Insular Affairs, Special Subcommittee on Irrigation and Reclamation. Hearings, Central Valley Project, California: Water Rights, Supplies, and Uses. October, 1951	8, 76, 77
	1			Governor [illegible] Warren	Statement	U.S. Congress. House. Committee on Interior and Insular Affairs, Special Subcommittee on Irrigation and Reclamation. Hearings, Central Valley Project, California: Water Rights, Supplies, and Uses. October, 1951	14, 23, 29
				Representative George P. Miller		U.S. Congress. House. Committee on Interior and Insular Affairs, Special Subcommittee on Irrigation and Reclamation. Hearings, Central Valley Project, California: Water Rights, Supplies, and Uses. October, 1951	8
				1952			
		1		California Assembly Interim Committee on Conservation, Planning and Public Works	Interim Report	Interim Report to the Legislature, March, 1952	15
		2		Robert L. Wing, Engineer, Division of Water Resources	Testimony in Assembly Hearing	Interim Report to the Legislature, March, 1952	16
	1	2		California Water Project Authority	Report	"Feasibility of State Ownership and Operation of the Central Valley Project of California"	18, 47, 77
	1			Division of Water Resources	Annual Bulletin	Report of the Sacramento-San Joaquin Supervisor for 1951, Bull. No. 23-51, October, 1952	21
	2	1		California Assembly, Senate Committee on Water Resources	Report	"Feasibility of State Ownership and Operation of the Central Valley Project of California," March, 1952	18, 47, 77
				1953			
				Division of Water Resources	Annual Bulletin	Report of the Sacramento-San Joaquin Supervisor for 1952, Bull. No. 23-52, November, 1953	21
				1954			
				Division of Water Resources	Annual Bulletin	Report of the Sacramento-San Joaquin Supervisor for 1953, Bull. No. 23-53, October, 1954	21
				1955			
	1			Division of Water Resources	Annual Bulletin	Report of the Sacramento-San Joaquin Supervisor for 1954, Bull. No. 23-54, August, 1955	24

TABLE XIV -Continued

IP	MP	S	E	Year/Reference	Nature of Reference	Source	Page
				1955 (continued)			
	1	1		State Water Resources Board	Bulletin	Water Utilization and Requirements of California, Bull. No. 2, June 30, 1955	34, 348
	1			Representative Sisk	Testimony	U.S. Congress. House. Committee on Interior and Insular Affairs, Subcommittee on Irrigation and Reclamation. Hearings on H.R. 4663, April 13-15	28
			1	Water Project Authority Board of Consultants	Independent Report	Report to Water Project Authority of the State of California on Salinity Control Barriers in San Francisco Bay Region, March 12, 1955	9
				1956			
				1957			
	1			Division of Water Resources	Annual Bulletin	Report of the Sacramento-San Joaquin Supervisor for 1955, Bull. No. 23-55, June, 1957.	8
		7		Department of Water Resources	Bulletin submitted to Legislature	Interim Report to the California State Legislature on the Salinity Control Barrier Investigation, Bull. No. 60, March 29, 1957	23-25
		3		California Senate	Report	Feasibility of State Ownership and Operation of the Central Valley Project of California, March, 1957	18, 47, 77
		1		California Assembly	Report	Assembly Interim Committee on Conservation, Planning and Public Works, Interim Report to the Legislature, March, 1957	15
				1958			
		1		U.S. Senate	Report from an investigation of the San Luis Obispo unit	U.S. Congress. Senate. Senate Report No. 2202, 85th Cong., 2nd Sess., 1958	6
	4			U.S. Supreme Court	Litigation pertaining to the 160-acre limitation	Ivanhoe Irrigation District v. McCracken, 357 U.S. 275 in Engle, H. Doc. 246	744, 745, 745, 753
				1959			
				1960			
		1		State Water Rights Board	Decision D990	Decision D990 (February, 1961)	48
				1961			
		1		Stephen C. Smith and Michael F. Brewer	Report	California Man-Made Rivers, History and Plans for Water Transfer. University of California, Agricultural Extension Service, June, 1961	13, 18

TABLE XIV-Continued

IP	MP	S	E	Year/Reference	Nature of Reference	Source	Page
				1961 (continued)			
		1		Department of Water Resources	Report	Delta Water Facilities, Bull. No. 76, Appendix Economic Aspects, December, 1961	3
				1962			
				William Gianelli, Member of Auburn Dam Committee	Testimony	U.S. Congress. Senate. Committee on Interior and Insular Affairs, Subcommittee on Irrigation and Reclamation, Hearings on S. 103, February, 1962	68
				1963			
	1			Division of Water Resources	Annual Report	The California State Water Project in 1963, Bull. No. 132-63, April, 1963	2
				1964			
	1			William Gianelli, Member of Auburn Dam Committee	Testimony	U.S. Congress. House. Committee on Interior and Insular Affairs, Subcommittee on Irrigation and Reclamation, Hearings on H.R. 2411, May, 1964.	72
				1965			
	1			William Gianelli, Member of Auburn Dam Committee	Testimony	U.S. Congress. House. Committee on Interior and Insular Affairs, Subcommittee on Irrigation and Reclamation, Hearings on H.R. 485, March, 1965	130
3	48	34	3	Total			
			88	Grand Total			

ative from the Second District and 5 years as a Senator. The district includes the Sacramento Valley and Congressman Engle was very active in water resource legislation writing the Trinity River Project, American River Development and Sacramento Valley Canal authorizing bills. While in the House, he served first as the Chairman of the Subcommittee on Irrigation and Reclamation of the Committee on Interior and Insular Affairs and later as Chairman of the Committee before he switched to the Senate in 1959. He served in the upper house until his death in 1964.[283]

Following the completion of Shasta Reservoir the Bureau began to firm up the summer low flows on the Sacramento with reservoir releases. Irrigation diversions increased at a rapid pace in the Sacramento Valley, growing from 932,230 in 1938 to 2,001,769 acre-feet in 1951, due primarily to the augmented flow.[284]

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[283] See Supra N. 250 and Stephen Paul Sales, "Clair Engle: The Formative Years," (unpublished M. A. thesis. California State University, Chico, 1973), p. 1. Engle's successor in the House, Representative Harold T. Johnson, is chairman of the House Water Resources Subcommittee and his two major committees control legislation affecting the Bureau and the Army Corps of Engineers. The Sacramento Bee, October 27, 1974, p. A-14.

[284] U. S. Congress, House, Committee on Interior and Insular Affairs, Special Subcommittee on Irrigation and Reclamation, Report on Central Valley Project, California, February 6, 1952, p. 15. This report is a committee print that did not receive a House report number. Thus, copies are rare and the author is grateful to the Bureau's librarian in Sacramento who borrowed one from a Bureau staff member.

When the Delta Mendota Canal began to export water in July of 1951, there was some question as to whether or not there was sufficient water supply to meet all the purposes--due to the unexpected Sacramento diversions. One possible alternative was the adjudication of the Sacramento River--a complex and expensive process facetiously referred to as a "legal frankenstein". Engle's subcommittee held three days of hearings in October of 1951 and he states at the opening:

> Now, the purpose of this hearing is twofold... To determine a basic fact, and second to establish a policy. The fact we would like to determine is whether or not the developed water in the Sacramento River is now oversubscribed. The policy we would like to establish is a proper function between the Federal and State governments in the operation of the Central Valley project.[285]

And:

> It is my understanding that all the water stored at Shasta Dam, save and except 300,000 acre-feet, has been committed to the San Joaquin Valley and for salt water repulsion in the delta... The question is: Do these uses, diversions from the Sacramento River exceed the natural flow of the river plus 300,000 acre-feet of stored water? If they do, then water is being used in the Sacramento Valley which is promised elsewhere. In that event, the legality of the commitments made in the San Joaquin and the delta will immediately be in issue, as well as the ability of the Central Valley project to work as intended under the State water plan.[286]

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[285] U. S. Cong. House Committee on Interior and Insular Affairs. Hearings on CVP: Rights, Supplies, Uses. p. 7.

[286] Ibid., p. 8.

Later Mr. Engle cross-examined Leland K. Hill, regional water rights engineer for the Bureau with the following question:

> Now is it true that all of the water behind Shasta Dam has been committed on contract into the San Joaquin or for salt water repulsion in the delta, saving and except 300,000 acre-feet? Is that question too long?
>
> Mr. Hill. Would you rephrase that again, please?
>
> Mr. Engle. Is it true that all the water stored behind Shasta Dam is committed into the San Joaquin or for salt-water repulsion, save and except 300,000 acre-feet reserved for future development in the Sacramento Valley?
>
> Mr. Hill. I would say in general your statement is correct.[287]

Engle, a well informed and powerful congressman, never once relinquished the idea that salinity control was on the same par as supplying the San Joaquin Valley. Over the years, the Bureau's salinity control utterances have firmly planted the idea that salinity control was a major purpose of the project.

The exchange aspect of Delta water for San Joaquin water was pointed out in the introduction of this chapter. The discussion of the need for the Peripheral Canal in Chapter VII explains in detail the hydrology during exportation. In the Engle Hearings, the author found the earliest confession of why Delta water quality must be protected. In the literature reviewed prior to this time, salinity control was promoted as a purpose to protect the Delta, but once the big Tracy export pumps were turned on it was obvious the success of the exchange contract depended on the export of a high quality water which translates into salinity control for the project as well as the Delta farmers.

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[287] Ibid., p. 77.

On the first day of the Engle Hearings, Leland K. Hill pointed out it took a Shasta release of 8,000 second-feet to export 610 c.f.s. at the pumps during July.[288] The interrogation that followed dealt with the Sacramento River shortages that would have occurred without the reservoir. After a thoughtful night, Clair Engle opened the second day of hearings by requesting an explanation. Bureau officials Leland Hill and Leland Graham explained the operation and the need to protect the Delta quality. The Hill-Engle-Graham discussion is herein reproduced.

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[288] Contract 175r-3401 between the Bureau and the Contra Costa County Water District, purveyors of the Contra Costa Canal water, is not as restrictive. The contract was negotiated in the 1930's and the quality provision was formulated for an agricultural supply, the dominant use at the time. Presently, most of the water is delivered to municipalities and the District prefers water containing not more than 100 ppm chlorides. The United States Public Health Service recommends an upper limit of 250 ppm and the contract states that the Water District does not have to take or pay for the water if it exceeds this limit at the Rock Slough intake. Water Quality at this point exceeded the 250 ppm value for twenty-three days in 1961 and twenty-eight days in 1959 when the historical maximum reached 374 ppm. From 1945 through 1966, water containing 250 ppm chlorides or less was available 99 per cent of the time, and water containing 100 ppm chlorides or less was available 65 per cent of the time: Contra Costa County Water District, Master Plan for Water Supply, March, 1968. The Andrus Island flood caused such a salinity incursion in the Delta that the water district had to purchase water from East Bay Municipal Utility District for 60 days: San Francisco Chronicle, July 3, 1972, p. 14. See discussion accompanying Ns. 104-106. Supra.

> Mr. Engle. Well, but is it plain that you have to keep the salt water back from the pumps in order to pump fresh water into the Delta Mendota Canal?
>
> Mr. Hill. That is correct.
>
> Mr. Engle. And is it true that you cannot operate the Friant Kern Canal thus changing the course of the San Joaquin River and diverting it south unless you supply the water from the Delta Mendota to take the place of the water which is thus diverted south?
>
> Mr. Hill. There is no other choice.
>
> Mr. Engle. Now, what I'm getting at and what I am trying to make clear is that we have a Rube Goldberg construction here with about six working parts and if any part of it doesn't work, the whole machinery collapses; is that right?
>
> Mr. Hill. Well, I wouldn't say the entire machinery would collapse.
>
> Mr. Engle. Let me ask you this. If you can't get enough water down the Delta Mendota canal to replace the water which was taken from Miller and Lux and turned south down the San Joaquin Valley, you cannot turn that water down south, can you?
>
> Mr. Hill. That is right.
>
> Mr. Engle. You will have more lawsuits on the San Joaquin because you haven't replaced the water which was theirs from the beginning of water rights in this State; is that correct?
>
> Mr. Hill. I couldn't answer that. I would rather refer that question to the legal people.
>
> Mr. Engle. I will ask Mr. Graham if that isn't correct.

> Mr. Graham. Generally so, Mr. Chairman. The result would be that we would have to turn Friant water down the San Joaquin in order to satisfy the requirements of Miller and Lux and therefore foreclose the Friant-Kern people from receiving water under the water-service contracts.
>
> Mr. Engle. In other words, the lower end of the San Joaquin would be out of water?
>
> Mr. Graham. Miller and Lux has the first claim on Friant water.[289]

Clair Engle, like most of us who approached the problem of Delta transfers, did not understand that salinity control is a project necessity until an explanation was provided. The literature is virtually void of such disclosures as the Bureau has chosen to display it as a project function not a project necessity. This is a bit deceptive as "...Salinity control is just as essentially a part of the overhead of this project as Shasta Dam itself."[290]

Following the Engle Hearing, the special subcommittee issued a tersely worded report containing the following phrases:

> There has been a lack of frankness with the Congress regarding project water supplies:
>
> ...misleading information has been given to the Congress... There has been an amazing lack of frankness, bordering on bad faith, in dealing with the Congress...

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[289] U. S. Cong. House Committee on Interior and Insular Affairs. Hearings on CVP: Rights, Supplies, Uses. p. 94.

[290] Stephen W. Downey in Ibid., p. 241.

> The project was apparently drifting into danger as far as water supplies are concerned... State and Federal representatives adopted a 'drift and hope' policy...[291]

The subcommittee concluded there was a shortage of water in the Sacramento River if all project commitments were to be met,[292] and it was perturbed to learn the Delta exports required a Delta outflow of 4,500 c.f.s. to maintain Delta export water quality as presented by Bureau testimony.[293] The obvious conclusion and recommendation of the subcommittee was that more reservoirs were needed.[294]

Since the publicized 4,500 c.f.s. Delta outflow was touted as one of the major project requirements that resulted in a shortage, the salinity control function played a major role in securing additional storage facilities. Bureau testimony before congressional utilizing salinity control as a need for the Trinity Division, is reproduced in the previous section.[295] The pattern was repeated for other additions such as the San Luis Unit, and Folsom and Auburn reservoirs.[296]

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[291] U. S. Cong. House Committee on Interior and Insular Affairs. Report on CVP, p. 5. Emphasis original.

[292] Ibid., p. 5.

[293] Ibid., p. 8.

[294] Ibid., p. 5.

[295] N. 275, Supra.

Spencer Letter

As will be pointed out in the subsequent chapter, many people in the state became discontented with the CVP, and investigations were launched to develop the present California State Water Project.[297] As a part of the State Project investigations the state diligently researched the feasibility of constructing a physical barrier, "...for conserving and developing waters presently being utilized for repulsion of sea water in the Sacramento-San Joaquin Delta."[298] The Bureau had not at this time perfected its water right for salinity control even though up to 6,000 c.f.s. was requested.[299] The state, it appears, planned to pick up this water, a substantial amount of which was natural flow, for the state project, by constructing a physical barrier.[300]

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[296] For the Trinity Division, see 1954 and 1955 of Table XIII; for the San Luis Unit, see Table XIV, 1958! for Folsom Reservoir, see Table XII 1949; and for Auburn Reservoir, see Table XIII, 1961 and Table XIV for 1962, 1964, and 1965.

[297] See discussion accompanying N. 411 Infra.

[298] DWR, The California Water Plan, Bull. No. 3, May, 1957, p. 5.

[299] State Water Rights Board, Decision D990, February 1, 1961.

[300] See discussion accompanying Ns. 536-540 Infra.

The question of how much water the Bureau had committed to this purpose was still unanswered, and the State Department of Water Resources wrote to the Bureau asking for a clarification. The regional director of the Bureau, C. H. Spencer, replied in what is appropriately referred to as the Spencer letter:

> I consider that the obligations of the Central Valley Project are satisfied when a satisfactory quality of water is provided at the intakes to the Contra Costa and Tracy pumping plants. It appears that, under present conditions of upstream development and diversion from the Delta, a computed outflow of approximately 1,500 second-feet will protect the intakes to the Tracy and Contra Costa pumping plants.[301]

The discordance between the Spencer letter and the myriad of salinity control commitments previously discussed cannot be reconciled. No further discussion is necessary; the emasculation of previous testimony speaks for itself.

A question arises as to why the Bureau used such a low figure (1,500 c.f.s.) in light of the fact that an outflow of 4,500 c.f.s. is required to secure the quality necessary for exportation. Perhaps this is the flow necessary to hold the salinity when the pumps are not operating. A speculative explanation may be that the Bureau did not want the state to claim the waters saved by the proposed barrier.

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[301] Letter from Bureau Regional Director, C. H. Spencer, to Harvey O. Banks, Director of DWR and Clair A. Hill, Chairman, State Water Board, July 10, 1957. Reproduced in Appendix C.

As project demands build up, salinity control will depend upon project releases more than on natural flow. Certainly, the stand was taken with the future in mind. If the Bureau or the state, independently or together, devised another means of exportation, the Bureau did not want to be left with a 3,300 or 4,500 Delta outflow commitment. Nor did the Bureau want to honor a large outflow commitment with the state project being developed. This would leave the Bureau in a position of underwriting the state project by maintaining the Delta outflow to protect the water exported by the state project.

At any rate, the potential impact on water quality in the Delta is immediately obvious in light of the presently proposed Peripheral Canal. Given the Bureau position stated above and the Peripheral Canal the Delta could become a salt water marsh except for the salinity control that would be provided by natural outflows. Chapter VIII will present the contemporary controversy; this chapter has set the stage by framing the historical controversy. Clearly, the Bureau had a lot of reasons to want to reduce the commitment, but one is forced to ask, did they have the right? This question is given considerable attention in Chapter IX.

CVP FINANCIAL STATUS AND POLICY

The economic impact of Delta outflows is somewhat related to the financial integrity and repayment policy of the project that maintains the outflows. Thus, the financial status of the SWP is examined in a subsequent section, and a brief perusal of the financial status and repayment of the CVP project follows.

As of 1972, the total U.S. investment in the CVP stands at \$2.13 billion, of which \$212 million has been repaid.[302] The Reclamation Act provides that the investment of the United States in irrigation and power facilities must be repaid to the Federal Treasury by the direct users of these services. Other uses such as recreation, fish and wildlife, and navigation are repayed by the national treasury. Some latitude exists in evaluating these uses and assigning them the appropriate repayment responsibility. For example, in the mid-40's, irrigation cost for the CVP was listed at \$200,000,000; but the irrigators were debited with a repayment bill of only \$55,000,000 due to the repayment afforded by the power revenues.[303]

Because the CVP generates much more electricity than it utilizes for pumping and has favorable reservoir sites, a minimum delivery system investment (when compared to the SWP), and a loosely structured repayment policy, the project is financially sound. This is reflected in the price its customers must pay for water. Agricultural users along the Folsom-South Canal will pay $2.75 per acre-foot, while those in the San Luis service area pay $7.50 per acre-foot. These figures compare rather favorably to the $22.87 per acre-foot which state customers in the San Joaquin Valley must pay.[304]

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[302] BOR, Central Valley Project, 1972, n.d., n.p.

[303] Robert de Roos, The Thirsty Land (Palo Alto: Stanford University Press, 1948) pp. 149, 150.

Probably, the most interesting aspect of the CVP financial program is the repayment arrangement which simultaneously utilizes the utility concept and the extension of the payout schedule. Price variations for water users of different service areas reflect the relative cost of storing and delivering the waters to the particular areas, but they also reflect the areas' ability to pay. Initially, the contracts were written so the water users would keep paying the established price long after Shasta Reservoir and other facilities are paid for. In 1956 Congress amended the contract arrangements instructing the Secretary of Interior to credit that portion of the irrigators payment over operation and maintenance cost towards repayment of their repayment obligation.[305] After power revenues repay their allocated cost they will be used to finance marginally financially feasible reservoirs and delivery systems.

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[304] California Legislature, Legislative Analyst, Water Resources Planning and Agricultural Water Needs, (January, 1973) pp. 41, 42.

[305] U.S. Supreme Court, Ivanhoe Case in H.D. No. 246 (85:1) pp. 747, 755.

In practice, however, these revenues never repay their allocated cost before they are partially applied towards the cost of new facilities. The first CVP features were to be repaid 50 years after completion. After the 50-year period, the project revenues would flow into the federal treasury. However, when new units (each with a 50-year repayment period) have been authorized, they have generally been integrated into the CVP rather than standing alone for repayment purposes. The entire CVP including the initial features, is then rescheduled to be repaid 50 years after the last project features are constructed. The project power revenues from the initial features which would otherwise flow into the federal treasury 50 years after completion are used instead to repay higher cost for the later features.[306] This amounts to a repayment subsidy for new project features and it insures the financial integrity of the project--at the expense of the national treasury.

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[306] Legislative Analyst, Water Resources Planning, pp. 40, 46.

CHAPTER V.

REBIRTH OF STATE PLANNING AND DEVELOPMENT: THE CALIFORNIA WATER PLAN

> I just say in conclusion, Mr. Chairman, that from what I can see here, this spectacle of these two huge agencies independently developing plans, particularly in view of the expenditure already made in the Central Valley project, it seems to me that this Feather River project is just some kind of a political scheme, and I don't understand either the basis of it or the implications of it, and I don't seem to be able to get any better understanding from the witnesses [A. D. Edmonston], but I can't believe that it is a really sound bonafide proposal for water conservation.
>
> Sam Yorty, 1951
> Supra N. 285, p. 180.

INTRODUCTION

The genesis of the present California Water Plan and State Water Project was evolutionary rather than spontaneous. Discontent in the state over the Federal Reclamation Laws attached to the CVP set the State Project in motion long before the voters approved the project's bond financing program, known as the Burns-Porter Act, in 1960. Campaigns were launched in Congress to abrogate the Reclamation Laws as they apply to the CVP, but they met with defeat. Similarly, the conflict was tested in the

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judicial arena with the U.S. Supreme Court unanimously reversing the California Supreme Court thereby upholding the law. Simultaneously, foes of the Reclamation Law instigated a movement to purchase the project which never jelled for lack of key support and because of a recalcitrant Secretary of the Interior.

As the events described above got under way in the late 40's the California Legislature directed the state engineer to investigate the state's water resources and produce a plan for their development. The end product was the California Water Plan published in 1957. The state engineer also produced the Feather River Project proposal and the Legislature authorized its construction and provided unlimited revenue bond financing in 1951. Detailed planning was conducted through the 1950's and the voters of the state endorsed the Burns-Porter Act in 1960, thereby providing the necessary general obligation bonds for the project's financing. The name of the project was changed from the Feather River Project to the State Water Project.

The reader may recall from Chapter III, the 1930 State Water Plan was developed with the Central Valley Project as the initial unit. Similarly the 1957 California Water Plan was developed with the State Water Project as the initial unit.

The 1933 Central Valley Project Act created the Water Project Authority (WPA) as the executive agency for the state Central Valley Project. The Authority consisted of five members from other state agencies which included the Director of Public Works, State Treasurer, State Controller, Director of Finance, Attorney General and the State Engineer who served as the Executive Officer.[307] Aside from applying for state grants when the state vied for federal funds for the state CVP,[308] the WPA had few official functions after the Bureau took over the CVP. State water resources administration was reorganized in 1956 and the WPA was disbanded with the simultaneous creation of the Department of Water Resources (DWR).[309]

With the Central Valley Project and the State Water Project both utilizing the Delta pool for exporting water, water quality problems in the Delta are multiplied by a factor much greater than two. The Federal-State Drift section of this chapter reviews the historical events outlined above that brought the state back into the water development and purveying business. The California Water Plan is then examined with special emphasis given to the salinity control element of the plan. The State Water Project is similarly analyzed in the next chapter.

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[307] H. Doc. No. 416 (84:1) pp. 431, 432.

[308] See discussion accompanying Ns. 239-241 Supra.

[309] H. Doc. No. 416 (84:1) pp. 479, 486. See Appendix A.

FEDERAL - STATE DRIFT

Initial Response to Federal Take-Over

It is no understatement to say that the state welcomed the Bureau and the CVP in 1935 with open arms. The project that was to bring the long-promised salvation for the San Joaquin Valley and the Sacramento-San Joaquin Delta had attained a reality status with a minimum of funds from the state treasury.

On the eve of President Roosevelt's authorization, Robert Bradford Marshall—the father of it all—telegrammed the President soliciting his support for a Bureau project.[310] And on the day of the President's action, the state Water Project Authority telegrammed Interior Secretary Ickes stating, " We are greatly pleased with the President's approval today of the Central Valley Water Project of California and desire to express our appreciation to him and you for favorable action. "[311]

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[310] In H. Doc. No. 246 (85:1) p.771. See discussion accompanying Ns. 172-177 Supra.

[311] In H. Doc. No. 246 (85:1) p. 771.

Following in the wake of the President's acceptance of the Bureau's favorable Feasibility Report, the California Senate and Assembly adopted identical resolutions memorializing the President and Congress to appropriate federal funds for the Central Valley Project, ". . . to be repaid in accordance with the Reclamation law."[312] The state lawmakers memorialized the President and Congress again in a like manner in 1937 and the Congress a third time in 1941.[313]

California's representatives in Washington were equally zealous in promoting the federal project among their congressional colleagues. In the 1937 House Appropriation Hearings, Representative Clarence F. Lea introduced the following witnesses on behalf of the project: Congressmen Buck, Englebright, Havenner, Welch, Carter, Tolan, McGrath, Gearhart, McGroarty, Voorhis, Kramer, Ford, Costello, Golden, Scott, Sheppard, and Izac.[314]

Testimony found in the 1937 Appropriation Hearings indicates that the state was ready to step aside for a full federal reclamation project. Consider the following:

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[312] _Ibid._, p. 766.

[313] Ibid., p. 768, The 1937 Joint Resolution is reproduced in full in Montgomery, _History of Legislation_, Appendix E, pp. 255-257.

[314] Montgomery, _History of Legislation_, p. 89.

> Representative Buck. But the State, itself, as I understand it, has no authority whatsoever to enter into this picture. It is intended to be, in my opinion, and I think I speak for all of my colleagues in Congress, that it is intended to be a Federal project, reimbursable under the reclamation law.
>
> State Engineer Ed Hyatt. Absolutely. That is the position. There is no question about that at all.[315]

The above indicates that the state accepted Reclamation Law with the federal project. Yet, the state maintained a tenacious grip on the idea of state administration and operation, and when conflicts later arose, as will be shown, the state made a strong bid to purchase the project to gain control and to circumvent the Reclamation Law.

Seeds of Contention

At the invitation of the state, the Bureau of Reclamation swooped into California to finalize planning, to design, build and administer the largest water development and transport project in the world (at that time). They depended, to a great deal, on the cooperation of the public at large and technical assistance from the state Water Project Authority (WPA). Conflicts, quite possibly, would have slowed the congressional appropriations and forestalled the uppermost desire in everyone's mind, federal and state alike--harnessing the water resources for the most productive use.

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[315] In H. Doc. No. 246 (85:1) p. 773.

The Bureau and the state WPA entered into a Memorandum of Understanding and a cooperative contract covering 1936-1939 which, in retrospect, may have been for different objectives.[316] The working arm of the WPA, the State Division of Water Resources performed studies and carried out negotiations with landowners, private utilities and others over water rights, relocation of facilities, and similar matters. The Bureau financed these activities.[317] Benefits for the Bureau were obvious. The Division of Water Resources, as the planners of the project, were thoroughly familiar with its workings; and their personnel negotiating in the field with fellow Californians gave the appearance of a minimum of change with the state-to-federal transfer.

For the state, the Memorandum of Understanding contemplated an agreement by which the WPA would operate and maintain the project "...upon presenting to the United States assurance of payment satisfactory to the United States."[318] The cooperative contract contemplated a contract to this same effect "...at the earliest practicable date...."[319] Thus the state kept alive the idea of a State Central Valley Project.

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[316] The cooperative contract was followed by three supplemental contracts, all within the 1936-39 period. All are reproduced in full in California Water Project Authority, Feasibility of State Ownership and Operation of the Central Valley Project of California, Bulletin No. 2, March, 1952, Appendix E, pp. 141-155. This bulletin was also published by the California Legislature. Senate Committee on Water Resources in March, 1952, with the same title and pagination.

[317] Montgomery, History of Legislation, p. 93.

In February, 1939, Governor Culbert L. Olson sent a letter to the Secretary of the Interior proposing a contract for the WPA to operate and maintain the Project. Secretary Harold L. Ickes replied on April 13, 1939, stating in part:

> The Central Valley Project is a Federal undertaking to be administered in accordance with the Reclamation law. You suggest that the Federal Government look to the California State Authority for repayment of its investment, both in water and power facilities. While the special act authorizing the Central Valley Project makes it possible for the Secretary of the Interior to contract with the State Authority, there is the underlying requirement of the Federal Reclamation laws as construed and applied by this Department, especially with respect to the principal part of the supply of irrigation water made available from a project, that repayment contracts shall be made only with agencies which have the power directly to assess and to create liens on the property of the water users. As I understand it, the Authority does not have this power, and it is, therefore, very

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[318] Water Project Authority, State Ownership and Operation and Operation of the CVP, p. 143.

[319] Ibid., p. 145.

> doubtful whether it could be the contracting agency for the purchase of the principal part of the water supply to be made available by this project.[320]

Secretary Ickes' letter dispelled any notion of a state take-over of the project. However, Governor Olson continued his pursuit of the project though this time he channeled his activities into public ownership of the hydroelectric power system. Revenue bonds were needed to finance construction and the governor attempted to have the Central Valley Project Act of 1933 amended to release up to 50 million dollars for this purpose. A bill referred to as the Pierovich Bill in support of such was introduced in the 1939 Legislature. The bill fell two votes short of the necessary two-thirds in the closing hours of the session.[321]

A powerful lobby with private power companies as the central figure, defeated this legislation as well as a subsequent attempt by Olson and Roosevelt (but opposed by Ickes) to set up a Central Valley Authority fashioned after the Tennessee Valley

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[320] Reproduced in The Sacramento Bee, May 26, 1939 in Montgomery, History of Legislation, p. 96.

[321] John McDiarmid, "California Uses the Government Corporation," American Political Science Review, Vol. 34, April, 1940, p. 304.

Authority.[322] Thereinafter attempts at state takeover of the CVP lapsed into a dormant stage until the forties as discussed below.

Implementation of the 160 Acre Law

As will be pointed out, the implementation of the federal 160 acre limitation on customers in the CVP service areas sparked a controversy that rivals any in California's water resource development history. The Law, as it applies to the CVP, was vigorously opposed in Congress and argued against in the highest court. Also, the state attempted to circumvent the law by buying the project and removing the law. All three methods failed, and the state built its own project.

This section will examine the controversy to recreate the atmosphere in which the State Water Project was created. As a prelude to the controversy the 160 acre law will be discussed.

The 160-acre law or the National Reclamation Act of 1902 is an extension of the Homestead Act, etc. in which the congressmen from the humid east, limited the acquisition of the public domain in order to preserve the family farm and discourage monopolies of land and water.[323] It reads:

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[322] Hugh G. Hansen, Central Valley Project: Federal or State? prepared for and published by the California Legislature. Assembly Interim Committee on Conservation, Planning, and Public Works with same title as Volume 13, Number 6, of the Assembly Interim Committee Reports, 1953-1955. May, 1955, pp. 120-122.

> No right to the use of water for land in private ownership shall be sold for a tract exceeding 160 acres to any one individual landowner, and no such sale shall be made to any landowner unless he be an actual bona fide resident on such land, or occupant thereof residing in the neighborhood.[324]

Congress, considering the delivery of project water to private land in 1912, required the owner to agree to sell any excess land.[325] Further refinement in 1926 required the Secretary of the Interior to appraise and set the price of the excess land, "...on the basis of its actual bona fide value at the date of appraisal without reference to the proposed construction of the irrigation works..."[326]

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[323] Many of the land limitation laws proved to be unworkable. The humid area congressmen just did not realize that the low per acre yields of dry farming or stock raising require large expanses of land. See Walter K. Kollmorgen, "The Woodsman's Assaults on the Domain of the Cattleman," Annals of the Association of American Geographers, Vol. 59, No. 2 (June, 1969), pp. 215-239.

[324] 43 U. S. C. 439 in Paul S. Taylor, "160-Acre Law," California Water, ed. David Seckler, p. 251. Graham writes "Much has been said and written about the federal acreage limitation..." to which he attaches footnote No. 410 containing 56 references. Graham, Federal-State Relationships, p. 152.

[325] 43 U. S. C. 419 in Taylor, "160-Acre Law," p. 258.

[326] 44 Stat. 649, as amended, 43 U. S. C. 423e (1958), in Graham, Federal-State Relationships, p. 154.

The administrative procedure is to deliver water to an excessive landowner only if he promises to sell the land over 160 acres (or 320 for man and wife) within 10 years at a price agreed to by the owner and the Secretary of the Interior.

Through 1972 project water customers have sold or contracted to sell over 500,000 acres of excess land.[327] This was the very thing the Central Valley farmers feared- losing their land in exchange for water.

In the Salinity Control Policy Formation section of Chapter IV it was pointed out that a cooperative atmosphere in California probably resulted in favorable annual appropriations by Congress.[328] Evidence exists that the Bureau remained tactfully silent on the 160 acre issue in the interest of maintaining favorable cohesion. Whatever the reasons the record is rather clear the Bureau did remain silent on the issue and in September, 1940 the WPA adopted a resolution which contains the following:

> NOW THEREFORE, BE IT RESOLVED by the Water Project Authority that the Executive Officer is authorized and directed to request the Secretary of the Interior for information concerning the applicability of the excess land provisions of the federal reclamation law to the Central Valley Project; the effect thereof if deemed appli-

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[327] BOR, Central Valley Project 1972, n. d., n. p.

[328] See discussion accompanying Ns. 267-268. Supra.

> cable; plans, if any, for the administration thereof; whether any investigation has been made or is contemplated to determine the effect of such provisions in regard to the different localities and variant conditions obtaining within the project area; whether it is intended to propose any legislation relative to exemptions therefrom or otherwise; and any other information that may be helpful to the Authority in considering the matter of such provisions in relation to the Central Valley Project.[329]

Ed Hyatt, Executive Officer of the WPA, testified before a subcommittee in 1944 that Commissioner Page replied by letter on November 5, 1940, saying in part:

> The problem raised in the resolution is being studied broadly by the Bureau of Reclamation. When information bearing directly on the problem in California is available, I shall be glad to provide it for you.[330]

Subsequently, the Bureau was accused of covering up the 160-acre law to which the agency replied:

> We have no authoritative information of any informal promises made by any Bureau official that reclamation laws would not apply.[331]

Montgomery and Clawson, generally in support of the Bureau, point out that the phrase, "...to be reimbursable under the reclamation law...", appeared in twelve congressional acts (1936 to 1946).[332]

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[329] In Montgomery, History of Legislation, pp. 155-56.

[330] Ibid., p. 156.

[331] In de Roos, The Thirsty Land, p. 92.

The 160 Acre Law and Congress

Acreage limitation became a major issue in 1943 primarily due to actions of the California Farm Bureau Federation and the Irrigation Districts Association of California. On November 18, 1943 the two groups passed twin resolutions strongly denouncing the acreage limitation and calling for its congressional repeal.[333]

The conflict quickly reached the floor of Congress (1944) in the form of a rider on the Omnibus Rivers and Harbors Bill (H. R. 3961). A committee amendment, referred to as the Elliott rider, after its author, simply stated:

> Sec. 4. The excess-land provisions of the Federal Reclamation laws shall not be applicable to lands

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[332] Montgomery, History of Legislation, p. 147. Foes of the acreage limitation strongly denounce this work. Senator Downey (Infra N. 339) a strong critic of the 160-Acre Law and this work, publishes (p. 44) in a book, Ed Hyatt's review of the Montgomery document. Hyatt said, "The publication is largely a jumble of quotations from newspapers, reports and speaches, is grossly onesided and biased, and is so incomplete and inaccurate as to be of little value in any case, with a text likewise so ignorant, incomplete and prejudiced as to make the report entirely unworthy of the Bureau of Agricultural Economics."

[333] Montgomery, History of Legislation, pp. 159-61. Peter M. Anderson, "The Bureau and the Valley," (unpublished M. A. Thesis, Dartmouth College, 1959), p. 37.

> which will receive a water supply from the
> Central Valley Project, California, reauthorized
> by section 2 of the River and Harbor Act Approved
> August 26, 1937.[334]

The amendment was adopted by the House Committee on Rivers and Harbors and H. R. 3961 was passed by the House. The measure up to this time drew little attention but battle lines were quickly drawn for the Senate consideration.

In support of the Elliott amendment were:

Farm Organizations:

- California Farm Bureau Federation and a number of local farm bureaus
- Irrigation Districts Association and a number of local irrigation and similar districts
- California Central Valleys Flood Control Association
- Agricultural Council for California
- Central Valley Project Association
- San Joaquin Valley Water Protective Association

Business Organizations:

- California State Chambers of Commerce
- Many (but not all) local Chambers of Commerce
- Kern County Land Company
- Miller and Lux, Inc.
- Di Giorgio Fruit Corporation

California State Agencies:

- Water Project Authority
- Agricultural Extension Service, University of California

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[334] In Montgomery, History of Legislation, p. 164.

In opposition were:

Farm Organizations:

- State Grange
- Farmers' Union
- Western Cooperative Dairymen's Union
- California Farm Research and Legislative Committee
- Some local irrigation districts

Veterans' Organizations:

- Veterans of Foreign Wars
- American Veterans' Committee
- American Legion
- Disabled American Veterans

Labor Organizations:

- American Federation of Labor
- Congress of Industrial Organizations

Religious Groups:

- Federal Council of Churches
- Catholic Rural Life Service
- Council for Social Action of the Congregational-Christian Churches
- Protestant Home Missions Council
- National Catholic Rural Life Conference

Other:

- League of Women Voters
- Some local Chambers of Commerce[335]

The Senate Committee on Commerce, to which H. R. 3961 was referred, rejected the rider after four days of hearings and the Senate upheld its actions. The conflict over the Elliot rider caused the death of the Rivers and Harbors Bill with the adjournment of the Congress on December 19, 1944.[336]

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[335] Hansen, CVP: Federal or State?, p. 125.

One of the strongest foes of the 160 acre law was California Senator Sheridan Downey. With the defeat of the Elliot rider, Downey put together a coalition of Senators from Colorado and Texas plus the other California member to sponsor S. 912 in the first session of the 80th Congress (1947). The bill's purpose was, "...To exempt from the land limitation provisions of reclamation law, the Central Valley Project in California, the San Luis Project in Colorado and the Valley Gravity Project in Texas."[337] Vigorously opposed by President Truman, the bill died in subcommittee.[338]

Within five months Sheridan Downey published a book, They Would Rule the Valley, in which he violently attacked the Bureau, especially Commissioner Straus and Regional Director Boke.[339] A similar force in the House conducted, "...an investigation of the Bureau of Reclamation and its administration of the Central Valley Project under Commissioner Michael W. Straus and Regional Director Richard L. Boke."[340] Soon thereafter Congress adopted a "Straus-Boke rider" to the annual Interior Department Appropriation Act (1949). This act authorizes the annual expenses of the Department and the rider was to withhold the salaries of the two officials.[341]

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[336] Ibid., p. 126.

[337] H. Doc. No. 246 (85:1) p. 683.

[338] Graham, Federal-State Relationships, pp. 80-81.

[339] Senator Sheridan Downey, They Would Rule the Valley. (n.p. San Francisco: 1947). Straus was not an engineer or a Bureau career man. Rather he assumed his position after serving as Assistant Secretary of the Interior prior to which he was a newspaper journalist. Boke had been with the Bureau only a few months before his appointment to Regional Director. He was recruited from the Department of Agriculture. Anderson, "The Bureau and The Valley," p. 49.

President Truman was placed in a difficult predicament when the bill reached his desk after Congress had adjourned. If he took exception to the rider and vetoed the bill, the Interior Department would be without a budget for the next year. A signature would dismiss two of his top aides. He had this to say upon signing the bill:

> ... This rider is designed to effect the removal of two men now holding such positions who have supported the public power policy of the Government and the 160-acre law which assures that western lands reclaimed at public expense shall be used for the development of family-size farms. No matter what may be asserted reasons for wanting to remove these men from office, the result would be to serve the purposes of special interests desirous of monopolizing the rich farm lands of the West and intent upon stopping the construction of transmission

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[340] H. D. No. 246 (85:1) p. 684.

[341] Ibid., p. 684. Downey attempted to put such a rider on the Bureau's Supplemental Appropriation for 1948. Jack Tull Casey, "Legislative History of the Central Valley Project, 1933-1949," p. 85.

> lines for the delivery of power from Federal dams. These same interests tried first to get the law changed but failed, and having failed then sought to get the management changed...[342]

Removal of the two officials was thwarted by Secretary of Interior Krug who asked them to remain in office without pay for most of 1949. They received their back pay in 1950 and remained with the Department until March, 1953.[343]

Clearly, Congress was not ready to relinquish this requirement as it applies to the CVP. Debates over the merits of the 160 acre law continue but as Graham so aptly states"...few of the arguments for or against it any longer have freshness."[344] Engle, himself, tried to abrogate the law but it continues to persist.[345]

The 160-Acre Law and the Courts

As with most controversies, the bitter fight over acreage limitation underwent the judicial process of resolving conflict.[346]

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[342] In H. Doc. No. 246 (85:1) p. 685.

[343] Ibid., pp. 684-86.

[344] Graham, Federal-State Relationships, p. 152. See N. 324 Supra.

[345] Taylor, "The 160-Acre Law" in California Water, p. 253.

[346] Material from this section was taken from Graham, Federal-State Relationships, pp. 63-97.

The test case, Ivanhoe Irr. Dist. v. McCracken, began in the Tulare County Superior Court and terminated some nine years later when the U. S. Supreme Court ruled 8-0 in favor of the limitation, thereby reversing a previous 4-3 decision of the California Supreme Court.

The Ivanhoe Irr. Dist. signed a contract with the United States on September 23, 1949, for the construction of a distribution system and for water service from the CVP. Under federal law, and by the terms of the contract, confirmation by a state court was required. Thus Ivanhoe filed a complaint seeking its confirmation on October 31, 1949.

Courtney McCracken, a landowner within the irrigation district, filed a demurrer. At the request, or suggestion, of the Irrigation Districts Association of California, State Attorney General Fred N. Howser also filed a demurrer on behalf of the state, attacking the validity of the limitation. Thereafter, the lame duck Attorney General strengthened the state's position by contesting the validity of the repayment contract. The Bureau promptly suspended construction of distribution systems of the CVP. If repayment contracts for the delivery systems proved to be invalid, the Bureau would have been in a disturbing predicament.

A subsequently elected Attorney General, Pat Brown, had three choices: he could continue the state's case, remove the state, or reverse the state's position. He chose the last; the Bureau reinstated its complete construction program the next day.

On February 27, 1953, the magistrate ruled the contract invalid under both state and federal law. Some irrigators received the decision in a celebrous atmosphere as "The Western Water News" published the text of the decision under the heading "Judge Jones' Opinion Hailed as Great Victory".

The case moved up to the state Supreme Court where it remained for almost four years. On January 24, 1957, by a vote of four to three, it upheld the decision of the lower court. The decision was not accepted across the board, but was followed by critical articles in the Stanford and California law reviews.

The complications in regard to the continuation of the project were becoming obvious. The Supreme Court of California ruled irrigation districts could not include acreage limitation provisions in their contracts with the United States. Under federal law, the Secretary of the Interior could not leave them out.

The conflict--in the courts--was resolved on June 23, 1958, when the Supreme Court reversed the California court, 8-0. One justice did not take part in the consideration or decision.

The courts and the Congress, two potential avenues of removing the acreage limitation from the Central Valley Project, had been exhausted. Two possibilities remained: one was to purchase the project and bring it under state control; the other was to build a separate state project.

Attempts to Purchase the CVP

As previously discussed, the early (1930's) attempts by Governor Olson for state ownership of the CVP were motivated by a desire to sell power and water at cost to the people of California.[347] Olson's idea of high voltage power lines feeding directly from the reservoirs to the consumer was a segment of the administration one scholar terms, "Olson's New Deal for California".[348]

Those that opposed Olson's public power program were staunch defenders of free enterprise, competition and laissez-faire. Ironically, but not surprisingly, the very nucleus of the state takeover in the mid-forties was formed from the residual of Olson's opposition in the mid-thirties.[349] The state takeover rebirth in the mid-forties was not passive or half-hearted. Rather, it was intensive and emotional. Anti-Bureau sentiment was running strong as the following statements testify:

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[347] See discussion accompanying Ns. 320, 321 *Supra*.

[348] Robert E. Burke, *Olson's New Deal for California* (University of California Press, Berkeley, California, 1953).

[349] Montgomery, *History of Legislation*, p. 117.

Ralph H. Taylor, Agricultural Council, Executive Secretary, June, 1944:

> The very farmers who put up the original funds to campaign for the Central Valley Project, so that a new water supply could be developed for their lands, now face a fight to escape being dispossessed of their lands by Secretary of Interior Harold L. Ickes under the Ickes plan to turn the Central Valley into a federal colonization project.[350]

State Senator Bradford S. Crittenden, June, 1944:

> The idea back of it is the 'dream child' of Secretary Ickes.... The whole fight over the Central Valley Project is developing into one of the administration attempting to set up a socialistic or communistic form of agriculture in the Central California Basin.[351]

Los Angeles Times, editorial, March 7, 1951:

> The underlying issue in the Ivanhoe case is whether the Federal Bureau of Reclamation in its vigorously pursued policy of 'seize water and electric power to gain political domination' is to be permitted to gain a stranglehold on California's internal resources.[352]

San Francisco Chronicle, editorial, February 14, 1947:

> But the importation of this 160-acre limitation into the Central Valley Project, where it has no justification, is an anomaly. It would mean rank discrimination between the people who now own land, saying to a farmer who owns 160 acres or less, 'You can buy water' and to one who inherited 200

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[350] Ibid., p. 110.

[351] Ibid., p. 115.

[352] In Graham, Federal-State Relationships, p. 68.

> from his grandfather, 'You can't buy.' And this is a project for which the farmers have to pay on the installment plan.'[353]

The twin resolutions by the Irrigation Districts Association of California and the California Farm Bureau Federation, referred to earlier,[354] sparked the 1940's state takeover of the CVP. At the request of the Legislature the governor provided funds (1945) to the state Water Project Authority, to investigate the state take-over.[355] State Senator Crittenden introduced a bill which would have authorized the Water Project Authority to negotiate with federal representatives for the return of control of the CVP to the state.[356] On the national level, Representative LeRoy Johnson introduced a bill to give California the option of purchasing all or part of the CVP.[357] Both were unsuccessful.

The Secretary of the Interior acted rather swiftly to define the federal position on the matter by letter to Governor Warren. Since the letter recreates, rather well, the movement underway, it is reproduced in toto:

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[353] In Ibid., p. 76.

[354] Supra N. 333.

[355] Hansen, CVP: Federal or State?, p. 130.

[356] Montgomery, History of Legislation, p. 121.

[357] Hansen, CVP: Federal or State?, p. 131

THE SECRETARY OF THE INTERIOR
WASHINGTON

March 7, 1945

My dear Governor Warren:

The question of whether the State of California is to assume the responsibilities of financing and constructing the Central Valley Project has been placed before you by a recently organized State group. A committee headed by Milton L. Kidd, which included Edward Hyatt, State Engineer, met with you to discuss this matter last January 18 and reported to the group they represented that your attitude was receptive.

A subsequent meeting was held in Fresno on January 26 at which Ronald B. Harris of the Irrigation Districts Association and Burnham Emerson of the North Kern Water Storage District submitted a draft of proposed legislation. On the following day pertinent legislation was introduced in the State Senate by Senators Crittenden, Deuel, Mixter, Fletcher and Cunningham.

The committee which brought about this movement has proposed that it raise a yearly budget of $38,000 to forward its activities through a Washington representative, who would be paid $12,000 a year, a Sacramento representative at $10,000, and a publicity agent at $12,000.

Naturally, the activities in relation to the Central Valley of such a group of well-known California citizens interests me, since the Bureau of Reclamation of the Department of the Interior has an investment of $157,180,000 in the Central Valley Project, and has plans for its completion which would involve additional expenditure of more than $200,000,000 during the postwar period, in order that all of the farmers of present and potentially irrigated lands might be assured of adequate water permanently.

In addition, the Bureau has tentative plans that might result in the construction in the Central

Valley after the war of works requiring hundreds of millions more. The Reclamation Law, of course, has provisions that have proved very useful in the development of the West, including the clause which enables advancement of Federal funds without collection of interest charges on the capital outlay. I assume, of course, that the State would wish to protect the project in the manner of these provisions in its legislation and with its credit and funds.

You will recall the circumstances under which the project became the responsibility of the Bureau of Reclamation in 1935, when the State of California was unable to negotiate satisfactory terms for the sale of an issue of $170,000,000 of revenue bonds authorized by the legislation of 1933. At that time the State was glad to have the Federal Government assume the burden of financing this project under the favorable provision of the Reclamation Law. Ability of the State to assume such a burden now, it seems to me, should depend partly upon whether it could buy out the investment of the Federal Government and finance the remainder of the project and related works itself. In the intervening years, the Reclamation engineers, working with your State Water Project Authority, have elaborated the plans originally put forward.

If the state has arrived at a financial position where it is ready to reimburse the United States Treasury for expenditures already made in behalf of the people of California, and is further prepared to guarantee the additional financing necessary to complete the project within a reasonable number of years, the Department of the Interior is prepared to withdraw from the project. Before we hand back these responsibilities to the State, however, we feel that sufficient evidence should be presented to prove the willingness and ability of Californians to shoulder the burdens of this great enterprise.

Attached hereto are data regarding the organization of a group of prominent individuals which may help to throw some light on the situation.

I would very much like to have your views on this, because the Bureau of Reclamation has made many commitments in regard to further development, and because the doubts which have been raised by the proposal to have the State again assume the responsibilities of constructing the Central Valley Project necessarily make us think twice before making further commitments, at least, until the present uncertainty is resolved. Do you think the State is now prepared to resume full responsibility for the project? Any information you can give me on the financial problems involved will be appreciated.

Sincerely yours,

(Sgd.)HAROLD L. ICKES
Secretary of the Interior.

The Honorable
Earl Warren
Governor of California,
Sacramento, California[358]

Governor Warren brought the conflict together in a well attended California Water Conference held in the capital city on December 6-7, 1945. A reporter's byline "Water Parley Ends in Verbal Battle Royal" denotes the disparity of opinions expressed.[359] The 500-page recording of the meeting, according to Hansen, contains the arguments that have surrounded the controversy from its conception to its demise.[360]

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[358] In The Sacramento Bee, March 6, 1945 as cited by Montgomery, History of Legislation, pp. 124-126.

[359] The Sacramento Bee, December 8, 1945, p. 1 in Graham, Federal State Relationships, p. 21.

Between 1945 and 1949, the Joint Legislative Committee on Water Problems held hearings and issued two reports, one in 1947 and another in 1949. The two major reports were extremely critical of Bureau policies and supported state control of the CVP. On the other hand, strong dissenting views were filed by the minority membership.[361]

Graham published a memorandum from Straus to Boke (1948) that candidly portrays the position of the Bureau. It is herein reproduced:

> . . . The Secretary J. A. Krug believes, and I concur, that we should be in a position to detail exactly what it would cost the State to get what, in the event the State were to take over. This should be calculated on the basis of making good the Federal Government's investment to date and carrying the authorized project to completion. This would bring out the fact that the state would have to tax itself for a vast amount of money, were this plan to carry through, and that the state would get no more than it is getting under the Federal operation at Federal expense in terms of water and kilowatts. The only 'benefit' the state would gain would be an opportunity to wreck the acreage and public power policy if the State actually decided it wanted to wreck such a policy, which is doubtful. Such a showing would also reveal completely the objections behind this revived theory of State takeover and the cost to the State of California in achieving those challengeable objectives.[362]

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[360] Hansen, CVP: Federal or State?, p. 132.

[361] Ibid., p. 132.

[362] Graham, Federal State Relationships, pp. 31-32.

Directed by a 1951 Legislative resolution the Water Project Authority prepared a 1952 report *Feasibility of State Ownership and Operation of the Central Valley Project of California*. In the same year, the Legislature appropriated $10,000,000 to the WPA "...for surveys and studies preliminary to state acquisition of the project upon a self-liquidating basis, and to pay the initial installments upon any agreement between the United States and the State for such purchase.[363]

During this time a new administration was established in Washington. This new administration was less cooperative but not responsible for the termination of the movement. The erosion of the state movement from within.

Visalia was the site of hearings on the matter in January, 1954, by the state Assembly Committee on Conservation, Planning, and Public Works. A self-imposed cost-benefit analysis of the proposals by the irrigators resulted in a unanimous rejection of state purchase. Not one irrigator stepped forward to endorse the proposal.[364] California's electorate in Washington, reflecting the desires of their constituents, had assumed a similar position.

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[363] Item 428.5, Cal. Stats. 1952, Ch. 3, in Water Project Authority, *Preliminary Report Relative to the Acquisition of the CVP* May 19, 1953 in Hansen, *CVP: Federal or State?*, p. 133.

[364] Hansen, *CVP: Federal or State?*, p. 265.

Engle, in an address in Chico, emphasized he is no friend of the Bureau but the initial financial burden of state purchase would stall additional project additions. The cost was estimated at $250 million which would almost double at 3 percent over the necessary 50 year financing period.[365]

In May, 1956, Governor Knight delivered the final blow in the form of a letter to the Commissioner of Reclamation. Pertinent excerpts are herein quoted:

> We note in the press releases from Washington that you recently informed the House of Representatives' Appropriation Committee that 'the State of California is trying desperately to buy the whole (Central Valley) project.' While it is true that the State has, in the past, made certain studies of the feasibility of State acquisition of the Central Valley Project from the Federal Government, in order that the record may be clear, I want to state unequivocally that the State of California has never submitted a firm offer to the Federal Government to purchase the Central Valley Project and is not now actively interested in such a purchase.... On June 30, 1955, the funds which had been made available by the Legislature for study of State acquisition reverted to the General Fund and no further appropriations have been made by the Legislature, nor have I asked for such appropriations. So far as my office or the Legislature are concerned at this time, there is no intent to attempt to purchase the Central Valley Project from the Federal Government.[366]

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[365] Representative Clair Engle, "The Central Valley Project-Operate, Not Buy It," delivered at Chico, Ca., September 24, 1952.

[366] Letter, Governor Goodwin J. Knight to W. A. Dexheimer, circa May, 1956 in Graham, Federal-State Relationships, pp. 49-50.

The last vertex of "give the project back to the people" plunged for the final time. In the next session (1957) the Legislature granted 25 million dollars to the state Department of Water Resources (DWR) to start construction on the State Water Project.[367]

There can be no doubt that the takeover movements were spawned in the anti-160-acre law movements. On the face of it, it is the only thing the state would gain. Not discounting the high initial payment as outlined by Engle above, the major cost may have been the jeopardizing of future federal allocations for additional segments of the CVP.

The Bureau has continued to construct reservoirs even through the controversial takeover period. Trinity, Auburn, New Melones, and San Luis have been completed or are under construction, as well as the Folsom South Canal which may become the first leg of a proposed East Side Canal. The Feather River was scheduled to receive two CVP reservoirs before the state constructed the Oroville Reservoir[368] and the San Luis Unit was before Congress for appropriation as a CVP facility before the state coerced the Bureau into sharing the project.[369]

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[367] N. 438 Infra.

[368] See S. Doc. No. 113 (81:1) Map, "Central Valley Basin California: Water Resources Development," (November, 1949), Sale: 1:1,000,000.

[369] H. Doc. No. 416 (84:2) p. 879.

To those who say the Bureau is solely interested in agricultural water and turned a deaf ear to the Los Angeles and San Diego metropolitan areas needs, it is pointed out that as far back as the late forties the Bureau had executed reconnaissance studies of diverting North Coast water into the Sacramento Valley with ultimate delivery to Southern California. Referred to as the Great Western Project, Representative Engle proudly proclaimed he instructed the Department of the Interior to put the document in the basement of the Washington Interior Department building to collect a "... good thick layer of frost."[370] Moreover, early planning documents by the Bureau had canals drawn to virtually every irrigable corner of the San Joaquin Valley.[371]

Why then this Feather River Project? A study was conducted in 1945 on land ownership patterns in the southwest San Joaquin Valley. It was found that nearly half of the irrigable land of Madera, Tulare, and Kern counties is owned by less than three percent of all landowners.[372] The State Water Project California Aqueduct snakes through this area. There is no acreage limitation attached to water from the aqueduct.

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[370] The literature also refers to a BOR, "United Western Investigation: Interim Report a Reconnaissance, California Section," Report UW1-2 (Salt Lake City, January 1951) Gurmukh S. Gill, Edward C. Gray, and David Seckler, "The California Water Plan and its Critics: A Brief Review" in California Water, Seckler Editor, p. 5. They are probably the same.

[371] Supra N. 368.

[372] Edwin E. Wilson and Marion Clawson, Agricultural Land Ownership and Operation in the Southern San Joaquin Valley (Berkeley, California: June, 1945) in Montgomery, History of Legislation, p.146.

CALIFORNIA WATER PLAN

As a prelude to this section, the reader will recall from the introduction to this chapter, the differences between the California Water Plan and the State Water Project. The Plan, presented in 1957, is a blue print for possible development; the project is a series of coordinated facilities that were outlined in the plan.

Development of the California Water Plan

The previously discussed atmosphere of discontent, resulting primarily from the federal Bureau's policy formation in the mid 40's, prompted a move by the State to regain control of its water resources. Activities launched in an anti-federal atmosphere provided the spawning bed for the California Water Project and the California Water Plan.

The State Water Resources Act of 1945 created the State Water Resources Control Board. First under the leadership of State Engineer, Edward Hyatt, and then A. D. Edmonston,[373] this Board served in an advisory capacity until 1947 when it was authorized to conduct an investigation of the water resources of California.[374] Of special interest to note, the 1947 law requires that "Full consideration shall be given to all beneficial uses of the State's water resources, [including] ... repulsion of salt water..."[375]

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[373] Cal. Stats. 1945, Ch. 1514.

The Board's planning progressed in three steps after each of which, a bulletin was produced. The first phase culminated with the State Water Resources Board's Water Resources of California, Bulletin No. 1, 91951) which inventoried the extent of the resource. The bulletin estimated the run-off of all California streams at about 71 million acre-feet and pointed out that more than 70 percent of the stream flow occurs north of the latitude of Sacramento.[376]

A second report estimating present use and anticipating ultimate requirements was issued in 1955. Approximately 20 million irragable acres were identified with a potential of 16 million irrigable in any one season. The ultimate annual supplemental water requirement in 1955 was 2.68 million acre feet.[377]

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[374] Cal. Stats. 1945, Ch. 1514 amended by Cal Stats. 1947, Ch. 154. Codified in 1953 as Sec. 12581.

[375] Ibid.

[376] State Water Resources Board, Water Resources of California, Bull. No. 1, 1951, p. 42.

[377] State Water Resources Board, Water Utilization and Requirements of California, Bull. No. 2, June, 1955. See also, DWR, California Water Flan, Bull. No. 3, May, 1957, p. 13.

A necessary first step in determining the potential water use for irrigation is the classification of agricultural land for irrigability. Such a process is essential not only for forecasting the water demand, but the ability of the land use to pay the water cost as well. Such a process did not precede the irrigation projections in this bulletin. In lieu of same, the bulletin reads:

> Results of the land classification surveys presented herein are not segregated into several classes as regards their adaptability to irrigation....It is probable that acreage determinations in future studies of irrigable lands in many areas of California will deviate from acreages as shown herein.[378]

Nevertheless, the Department of Water Resources used the projections to forecast an eventual need to develop an additional 31 million acre-feet of water for a total developed supply of 51 MAF.[379] A scheme to implement this transfer is found in the third and final planning document, The California Water Plan, presented in May, 1957.

There has been some misunderstanding about what the California Water Plan is and what it is not. Conservationists reacting in alarmist fashion viewed the plan as a construction proposal by the State Department of Water Resources. For example, the potential reservoir sites on the northcoast streams published in The California Water Plan are tabulated under the heading "Box Score of Proposed Devastation" in the California Committee of Two Million's Wild Rivers Reporter. The same publication carries an equally zealous centerfold illustrating the reservoir sites with the title, "We can't Let This Happen!"[380] The fact that the forementioned illustration was published 13 years after the water plan, testifies to the persistence of the belief that the 1957 California Water Plan was a project proposal.[381]

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[378] Ibid., p. 46. An obvious example of over projecting agricultural expansion can be found in the arid Colorado Desert and Lahontan areas. The Plan envisions an increase from 823,000 acres to 3,650,000 acres--an enlargement of 343.5 percent. Figuring approximately 5 acre feet of water per acre of cultivation results in a water demand of over 18 million acre feet. Ibid., Table 171 p. 222; Table 172, p. 223.

[379] DWR, The California Water Plan, Bull. No. 3, May, 1957, pp. 15, 14.

Probably nothing illustrates the limited nature of the plan more than the fact that economics were not incorporated into the evaluations. Demands do not reflect the ability of the potential users to pay and it follows, there was no economic justification for locating potential reservoir sites.[382] Subdued qualifications appear in the

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[380] California Committee of Two Million, Wild Rivers Reporter, 1970, pp. 8-9.

[381] See also W.H. Hutchinson, California: Two Centuries of Man, Land, and Growth in the Golden State (Palo Alto, California: American West Publishing Company, 1969), p. 323-332. The author is so convinced California cannot meet its water demands, even with full development of the California Plan, that he discusses the North American Water Alliance scheme for importing Alaskan water.

[382] Bull. No. 3 was to have had eleven appendices, as is indicated on p. XI. Appendix H, Economic and Financial Aspects of the California Water Plan, as well as most other appendices, were not found by this researcher.

(Duplicate of p. 217)

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[379] DWR, The California Water Plan, Bull. No. 3, May, 1957, p. 16.

> As knowledge increases, as technology improves, as conditions change through the years, and as future patterns of development become more easily discernable, more suitable alternatives to any feature or features herein discussed are likely to be found.[383]

and:

> It is fully acknowledged that certain of the forecast ultimate requirements for water may never be realized, and that the facilities which would provide for those requirements may never be constructed.[384]

A letter from an independent five member board of engineering consultants hired to study the plan is published at the beginning of the report and the following excerpt illustrates the plan's lack of sophistication:

> . . . The California Water Plan, as presented in Bull. No. 3, includes projects of doubtful economic justification and works of unproven physical feasibility.[385]

The following independent quote from a member of the review board states rather well what the plan is, and what it is not:

> Many an untruth has been accepted as truth for no better reason than repetition of that untruth. It may be that full development of the water resources of California will be necessary, but a statement to that effect does not make the assumption a fact, no matter how many times the statement may be made.

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[383] DWR, The California Water Plan, p. 37.

[384] Ibid., p. 37.

[385] Ibid., p. XV.

> The California Water Plan...was built on the premise that full development was necessary. Those responsible for this plan estimated the quantities of water that could (I repeat, could) be used for domestic, industrial, and agricultural purposes in all sections of California. The planning of the physical works required to satisfy these assumed demands for water was carried out in disregard of the costs of development, transportation, and delivery of water to each area of potential use. Nothing was done to determine the quantities of water that should (I repeat, should) be used for domestic, industrial, and agricultural purposes.[386]

Impact and Purpose

What the plan in fact did was to create a feeling of urgent need for water resource development. Publishing qualifications along with the inflated and unjustified water demand figures does not give the reader much assurance that the reservoirs were not needed. The planners knew most of the readers would be influenced by the large figures and that was the intent, regardless of a few qualifications thrown in for professional respectability.[387] In several places, the plan stresses urgent demand for construction of the Feather River (State Water) Project as the following two passages testify:

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[386] Raymond A. Hill, "Economic Issues in California's Water Development," presented before the Conference on the Economics of California's Water Development, Lake Arrowhead, August, 1957, in P. H. McGauhey and Harry Erligh, Economic Evaluation of Water: Part I: A Search for Criteria, University of California, Berkeley, Sanitary Engineering Research Laboratory, Technical Bulletin 14, July, 1960, p. 42.

[387] See N. 381 Supra.

> The need for solution of the present and future water problems of California is clear. It is also clear from a study of the past history of water development in the State that the future growth of California will depend upon a coordinated statewide program for water development. The authorized Feather River Project, the first truly statewide project, will be the first major step in this direction. However, even if the project were constructed and in operation today and serving all areas of water deficiency, it would barely overcome the deficiencies of the present. In other words, the large water supply to be gained from the Feather River Project is fully needed today.[389]
>
> . . . . .
>
> The Feather River Project, the initial unit of the California Water Plan, must be started immediately and other projects must follow in the near future. The California Water Plan, a coordinated master plan, should be accepted as the general framework or pattern for future water development in the State. Finally, and this cannot be emphasized too strongly, solution of the water problems of California lies in the construction of physical works - not alone in laws and reservations of water, however necessary these may be as steps in the process.[390]

Salinity Control and the California Water Plan

While salinity control is included in the three major planning documents produced in the State's investigative-planning (1947-57) decade, it assumes a low profile due to the degree of commitment pledged by the Bureau. Shasta Dam was in operation providing salinity control three years prior to the planning authorization in 1947, and the Bureau maintained the benefit without comment through the planning period. Apart and separate from actual operational necessity, as explained elsewhere,[391] the Bureau reversed or debilitated its salinity control policy via the Spencer letter in March, 1957, two months before The California Water Plan was published.[392] Regardless of the degree to which the Bureau pledged the CVP to salinity control, it is important to realize, the state considered the purpose as a necessary reason for further development of key California water resources.

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[389] DWR, The California Water Plan, p. V.

[390] Ibid., p. VI.

The purpose of Bulletin No. 1, Water Resources of California (1951) was to present a compilation of water resource data. This document established how much water there is in California. It was not concerned with use. The 1947 amendment to the State Water Resources Act of 1945, which contains a reference to salinity control[393] is reproduced in the document and the following is the only other salinity control reference found therein:

> In the Central Valley, conservation features will provide a substantial measure of salinity control,

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[391] See the discussion accompanying Ns. 288-289 Supra, and Ns. 545-550 Infra.

[392] Supra N. 301.

[393] Supra N. 374.

as well as improvements to navigation.[394]

As previously outlined, Bulletin No. 2 (1955) addressed water utilization and requirements. Five references are made to salinity control as a purpose of Shasta Reservoir[395] and one additional statement outlines the historical problem, stating an outflow of 4,500 cfs is necessary and the Division of Water Resources is studying barrier proposals to recover this water.[396]

The final planning document, The California Water Plan, published in May, 1957 contains 17 references to salinity control.[397] Four such statements confirm the Central Valley Project commitment,[398] while other multiple purpose statements associate the CVP function with The California Water Plan as this following quote illustrates:

> The California Water Plan gives full consideration to the use of water for agricultural, domestic, and industrial purposes; to hydroelectric power development; to flood control and protection; to drainage; to salinity control;

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[394] State Water Resources Board, Water Resources of California, p. 23.

[395] State Water Resources Board, Water Utilization and Requirements of California, pp. 25, 34, 153, 172, 384.

[396] Ibid., p. 180.

[397] DWR, The California Water Plan, pp. XXV, 2, 5, 6, 14, 15, 20, 38, 93, 98, 186, 187, 187, 187, 191, 242, 243.

[398] Ibid., pp. 14, 15, 20, 98.

> to protection of the quality of water; and to the interest of fish, wildlife, and recreation.[399]

As will be discussed in Chapter VII, other studies, parallel in time, had resurrected the barrier proposals that had briefly flourished with the inception of the original State Water Plan of 1931.[400] At the time the 1957 California Water Plan was published, a modified barrier proposal known as the Biemond Plan was proposed as part of the State Water Project. According to the California Water Plan, "The Biemond Plan was designed to transfer water across the Delta. . . and to conserve salinity control flows."[401] The Biemond Plan is discussed further in Chapter VII of this thesis. A question is raised about which project would have recovered these salinity flows, the state project that was to build the barrier and conserve the water, or the federal project that was maintaining the releases.[402]

Notwithstanding the problems beginning to surface as to who maintains salinity control, there can be no doubt the plan considered it as a necessary reason to continue the development of California's water resources. The three planning documents, as previously presented, addressed the issue, and additional assurance is found in the following statements by the Director of the Department of Water Resources, Harvey O. Banks:

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[399] Ibid., p. 242.

[400] For the proposals in the fifties see Ns. 508-524 Infra; the proposals of the twenties are discussed between Ns. 181-186 Supra.

[401] DWR, The California Water Plan, pp. 186, 187.

[402] See discussion accompanying Ns. 536-540 Infra.

> It [the Plan] would control floods...; control salinity in major rivers, ...replenish the depleted underground reservoirs and repel sea water from the coastal basins.[403]

And before a California Senate Committee, Mr. Banks stated:

> Let me emphasize that no plan, federal or state, will take water from the Delta that is or will be needed for uses therein. There is now and will continue to be surplus water available in the Delta during winter and spring months of most years which can be diverted to areas of deficiency with no detriment to the Delta.
>
> I wish to emphasize again that planning by the Department of Water Resources to solve California's water problems recognizes the needs of the Delta and projects are being conceived so as to prevent detrimental effects which would upset the Delta economy.
>
> The most important existing problems of the Delta are intimately entwined with problems of the remainder of the Central Valley and their solution depends in

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[403] Harvey O. Banks, DWR, Director, "A Report on the California Water Plan," before Annual Forum of Agricultural Chemicals Association. Villa Hotel, San Mateo, California, October 9, 1956. Several of Mr. Banks' public addresses are on file in the University of California, Berkeley, Water Resources Center Archives.

large part upon continued development of the water resources of the State![404]

State planners used salinity incursion to promote the state Central Valley Project; as did federal officials to promote the original facilities of the Central Valley Project plus subsequent additions. Thus, the Director, as portrayed above, was repeating the first step of a long established pattern. Once the state project was under construction, the state planners like the Bureau, relaxed its salinity control statements thereby completing the pattern.

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[404] Harvey O. Banks, DWR, Director. Statement before the Senate Interim Committee on Proposed Water Projects, January 22, 1958. The Director made five other references to salinity control. See Ns. 432, 457 Infra for other commitments by the Director.

CHAPTER VI

STATE WATER PROJECT

> It [Feather River Project] is a very serious proposition, and certainly the State shouldn't go into this with their eyes closed. They want to know where they are coming out. I want to make this clear. I am not personally advocating the project. If the people want this project that is something they will have to pass upon as far as I see it.
>
> A. D. Edmonston. 1951
> Supra, N. 227, p. 150.

> I don't know whether it would be of interest to you, but I was on one of the first trips in 1951 with the late State Engineer A. D. Edmonston in laying out the route of the California Aqueduct. I remember we got a shovel out of the car at the base of the Tehachapi Mountains and posed with it for some pictures in a make-believe groundbreaking. . just the thought of lifting water up the face of those mountains seemed like some kind of a fantastic dream.
>
> John R. Teerink, 1973[405]

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[405] Association of California Water Agencies, Western Water News, September-October, 1973, citing Metropolitan Water District of Southern California, Aqueduct, August, 1973.

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INTRODUCTION

The introduction to Chapter V recounts how the State Water Project relates to the other plans and projects discussed in this thesis. The State Water Project and California Water Plan were developed simultaneously. The Plan started in 1947 and it was published in 1957. Published as the Feather River Project in 1951, the State Water Project was quickly authorized and funded with revenue bonds by the Legislature. However, the project was not financially feasible and the materialization of the project during the fifties entailed the development of a feasible financial program.

This chapter describes in general the project as it exists today; discusses the development of the project, including financial aspects; examines the treatment of salinity control in the three planning documents, and closes with a cursory look at the present financial status and repayment policy of the project. It is pointed out later but it should be stressed here also, project salinity control policy formation is considered in greater detail in Chapter VIII. The discussion contained in this chapter deals predominantly with the topic as it appears in the three project planning documents discussed below.

DESCRIPTION

In the upper reaches of the Feather River high in the Cascade Range of California, Frenchmen Lake stores water that is delivered to the terminal reservoir of the project, Lake Perris in Riverside County (See Fig. 1). Frenchman and two other small reservoirs are collectively referred to as the upper Feather reservoirs that aid the large downstream facility, Oroville Reservoir, in regulating the sporadic flow of the Feather River.

Oroville Reservoir is created by the tallest dam in California. At the time of its completion in 1967, the 770 foot high structure, according to the Department of Water Resources (DWR), was the highest earth fill dam in the world.[406] Other researchers published a few years later point out the facility is now surpassed in all measurements including height, length, amount of fill and water storage.[407]

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[406] DWR, California's Challenge and Opportunity, unnumbered brochure (1967), p. 12.

[407] As of 1970 Oroville Dam was the eighth highest in the world; U.S.S.R. has a 1017 foot earth fill. In amount of fill, the reservoir is sixth; Pakistan is the site of a 186 million cubic yard facility. T.W. Mermel, "World's Highest and Largest Dams," Civil Engineering, Vol. 40, No. 7 (July 1970), p. 96. Over fifty U.S. reservoirs are longer than the 1 mile long facility and in gross water storage, the facility ranked 40th worldwide in 1969. David Keith Todd, The Water Encyclopedia (Port Washington, N.Y.: The Maple Press Company for the Water Information Center, 1969). In Table 7-1, Highest Dams of the World Arranged by Countries, pp. 387-400, this author ranks Oroville 14th in height.

Releases from the reservoir flow through six generators into Thermalito Forebay. Three of the generators are reversible and a portion of the water that is released into the forebay is back pumped into Oroville Reservoir during periods of low electricity demand. This water is released again during periods of high electricity demand. Power companies pay the project a premium price for peak electricity and they sell the project off peak electricity for pumping at a reduced rate.[408]

Water released from Thermalito Forebay falls through another set of pumpback generators into Thermalito Afterbay. The Thermalito Forebay-Afterbay system is a diversion from the Feather River and once the water flows through the afterbay it is discharged back into the river about ten miles downstream from Oroville Reservoir. Thence, the water flows by gravity to the Sacramento-San Joaquin Delta.

A North Bay Aqueduct is scheduled to deliver water from Cache Slough in the northern portion of the Delta to Solono and Napa Counties but the service areas have not authorized construction.[409] A South Bay Aqueduct diverts water from the California Aqueduct to the southern part of Alameda County plus Santa Clara

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[408] On the subject of power and the project see the discussion accompanying Ns. 494-497, especially N. 495. Infra.

[409] See text in N. 523 Infra.

County.

Project water is lifted 244 feet up and out of the Delta by 11 pumps of the Delta Pumping Plant. This giant facility with a capacity of 10,300 c.f.s., will lift four billion gallons of water a day to be sent south in the 443 mile California Aqueduct. Sixty-six miles from the Delta facility a portion of the water is used to fill the San Luis Reservoir as explained earlier.[410] All told, Delta water is lifted 1,000 feet up the San Joaquin Valley to the A. D. Edmonston Pumping Plant at the base of the Tehachapi Mountains.

About half of the project water is delivered in the San Joaquin Valley and the other half is pumped in a single lift 1,962 feet up the Tehachapis to flow through the 4.8 mile Carley V. Porter tunnel and emerge on the south side of the mountains. A short West Branch Aqueduct terminates in Castaic Lake on the Santa Clara River but the main aqueduct continues along the western fringe of the Mojave Desert, tunneling through the San Bernadino Mountains to debouch into Lake Perris near Riverside. Water from this lake can be diverted into the Metropolitan Water District of Southern California's Colorado River Aqueduct.

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[410] See discussion accompanying N. 251 Supra.

Fig. 1 identifies a Coastal branch from the California Aqueduct to the coastal area of San Luis Obispo and Santa Barbara counties. Similar to the North Bay Aqueduct, the service area of this facility has not authorized construction.

DEVELOPMENT

Unlike the Central Valley Project that was planned in detail before Legislative and voter approval, the State Water Project was approved after a recognizant level study. This section discusses that study and the two other major documents that defined the project generally, before it was constructed.

Feather River Feasibility Report - 1951

In retrospect there can be little doubt that the publishing of the Report on Feasibility of Feather River Project and Sacramento-San Joaquin Delta Diversion Projects Proposed as Features of the California Water Plan, by the State Water Resources Board in May, 1951, was one of the most significant events in California's water resource history. This report signaled the official beginning of the state's sedulous campaign for the construction and operation of the State Water Project.

By coincidence it was also the first year the CVP went into full operation. The Delta Mendota Canal was wheeling its first deliveries to the Mendota Pool on the San Joaquin River. This water is substituted for water diverted from the San Joaquin headwaters through the Friant-Kern Canal to the Bakersville area. The irony is obvious, water shortage solutions in the southern San Joaquin Valley were fully implemented on the prelude of the project to satisfy California's water problems.

The events that lead to the 1951 study and report are unique. As presented in this chapter hopes for removal of the CVP's acreage limitation via Congressional action were severely crippled in the late forties and the state actively pursued a program to purchase the project. A major participant in this campaign was the California Central Valley's Flood Control Association, which was one of six parent groups that formed the State-wide Committee for California Ownership of the Central Valley Project.[411] This small bit of recall becomes exceptionally significant with the reproduction of the following introductory paragraph to the 1951 report:

> The State Water Resources Board, the Department of Public Works, acting through the agency of the State Engineer, and the California Central Valley's Flood Control Association, entered into an agreement as of February 1, 1951, whereby the association agreed to pay $7,500 for the preparation by the State Water Resources Board and the State Engineer

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[411] Hansen, Federal or State?, p. 134.

> of an interim report on the Oroville Project on the Feather River in the County of Butte.[412]

The foregoing varies somewhat from the usual pattern. Introductions to major reports that require millions of dollars to implement usually reproduce the legislation authorizing the investigation. This study was not authorized by the Legislature. The literature has not criticized Edmonston for exceeding the powers of his office by conducting the investigation, but he has been accused of, "... Enlarging on what in other hands might have been a routine investigation of flood control..."[413]

While the degree of detail contained in the 1951 feasibility report can only be described as reconnaissance level, the $7,500 provided by the Flood Control Association could not have covered the total cost of the investigation. Tacit approval or encouragement by the legislature is more than suggestive as the state had to pay the bill for most of the investigation.

The report analyzed the physical and economic feasibility of storing Feather River water and transferring it 576 miles south of the Delta to the headwaters of the Tia Juana River near San

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[412] State Water Resources Board, Feasibility Report (1951) p. 11.

[413] Cooper, Aqueduct Empire, pp. 201-202.

Diego.[414] Salinity control considerations will be covered in a subsequent discussion. General conclusions include: (1) There is a need for flood control on the Feather River, (2) There is an immediate need for supplemental water in many of the service areas contemplated; (3) the project would meet these needs; (4) the project is engineeringly feasible; (5) the project is the most practicable and economic solution.[415]

Capital cost of the project was estimated at $1,270,387,000 with a federal nonreimbursable grant of $50,000,000 (flood control) and a state nonreimbursable grant of $86,926,000 (state interest) for a repayable cost of $1,133,461,000. This estimate did not include the interest cost or an escalation factor for future construction cost. Financed at 3 per cent, the annual cost would exceed the annual revenues by $1,898,400.[416] The report concluded the project facilities:

> ...are not financially feasible on the basis of revenue derived from water charges and the sale of electric power at the rates assumed in the report unless the Federal and State Governments contribute to the cost of the project funds in substantial amounts in the

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[414] State Water Resources Board, Feasibility Report (1951) p. 40.

[415] Ibid., p. 51.

[416] Ibid., p. 49.

> interest of flood control and water development on the basis of state-wide concern.[417]

The Legislature authorized the project giving the DWR a wide latitude to modify the project as the following authorization passage testifies:

> The units set forth in publication of the State Water Resources Board entitled "Report on Feasibility of Feather River Project and Sacramento-San Joaquin Delta Diversion Project Proposed as Features of the California Water Plan," dated May, 1951, as modified in the publication of the Division of Water Resources entitled "Program for Financing and Constructing the Feather River Project as the Initial Unit of the California Water Plan," dated February, 1955, and including the upstream features on the south fork of the Feather River, and as further modified by the recommendations contained in Bulletin No. 78 of the Department of Water Resources, entitled "Preliminary Summary Report on Investigation of Alternative Aqueduct Systems to Serve Southern California," dated February, 1959, and subject to such further modifications thereof as the Department of Water Resources may adopt, and such units or portions thereof may be constructed by the department and maintained and operated by it to such extent and for such period as the department may determine, as units of the Central Valley Project separate and apart from any or all other units thereof.[418]

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[417] Ibid., p. 51. The $1,898,400 deficit analysis discussed above (N. 416) assumes the above grants would be made. The word "substantial" in the above quote is an understatement.

[418] Cal. Water Code. Sec. 11260. Added by Stats 1951 Ch. 2043. Later amendments updated the section to include subsequent reports and substitute Department for Authority in all instances but the basic language stayed intact. Emphasis added.

In the same Act, the Legislature provided an unlimited amount of revenue bonds to finance the project. The Legislature did so by resurrecting the bonds approved by the voters in 1933 for the Central Valley Project.[419] These bonds had lapsed into a dormant stage when the Central Valley Project became a federal undertaking. When the Legislature approved the issuance of these bonds for the Feather River Project in 1951, "...as units of the Central Valley Project separate and apart from...," the $170 million ceiling was also removed.[420]

These CVP revenue bonds, approved by the voters in 1933 and resurrected by the Legislature in 1951, were not sold for several years and then only on a limited basis.[421] It will be remembered that state issued revenue bonds, unlike general obligation bonds, must pay their own way. That is, the earnings of the project financed are relied upon to meet its costs. A project must be on a sound financial basis, since annual revenues must be sufficient to repay the interest and principal of the bonds plus operation and maintenance, replacement and other expenses. The revenue bonds were not sold in 1933 because the Central Valley Project was not self-liquidating and they were not sold in 1951 for the same reason. The Feather River Project, at that time, was not financially feasible without substantial federal and state grants.

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[419] Supra., N. 223.

[420] The removal of the revenue bond limitation appears as deletions from Secs. 11700-11702 of the Cal. Water Code. Hansen, CVP. Federal or State?, p. 133. The writer discusses the implications of this action as it relates to salinity control between Ns. 457 and 461, Infra. The legality of the Legislative action was tested in court. N. 480 Infra.

[421] See the discussion between Ns. 480-485 Infra.

Financial aspects quickly emerged as the number one project consideration. A politically acceptable financing-repayment program had to be developed within the framework of financial feasibility. To be sure, sizing, location, and operation of the envisioned facilities had to be finalized to estimate the total cost. But, it was realized very early, the cost may be greater than the potential customers' ability to pay. Not only did the authorized project have an extensive delivery system with high capital and pumping cost (the aqueduct system requires three-fourths of the total capital cost), but the best reservoir sites were already utilized by the Bureau's CVP storage facilities. The Bureau had considered development of the Feather River system as an addition to the CVP but opted for the Trinity River system instead. A Bureau official testified in a congressional hearing, "... And of some twenty or thirty reservoirs that were considered, the Feather River system was the most expensive at that time."[422]

Report on Program for Financing the Feather River Project-1955

The Division of Water Resources was allocated $2,227,056 in 1952, 1953 and 1954 to continue investigations and develop specifications for the project.[423] In February of 1955 the Division resubmitted the plan in a document entitled, *Program for Financing and Constructing the Feather River Project as the Initial Unit of the California Water Plan.* The Legislature voted for an independent review by the Bechtel Corporation, a firm of consulting engineers. Bechtel returned a generally favorable review in four months and the Legislature responded with a $9,350,000 authorization for reimbursement of Division funds for prior expenditures, engineering, exploration work, acquisition of reservoir sites and studies.[424]

Four months, from contract to completion, is an extremely brief period for a full economic, engineering, and financial evaluation of such a large and complex project. Thus, most of the state's assumptions had to be accepted without investigation. Generally,

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[422] Leland K. Hill, Bureau Regional Water Rights Engineer in U. S. Cong. House Committee on Interior and Insular Affairs. *Hearings* on CVP: Rights, Supplies:Uses, p. 178.

[423] McGauhey, *Economic Evaluation of Water*, p. 62.

[424] DWR, *Investigation of Alternative Aqueduct Systems to Serve Southern California*, Bull. No. 78, December, 1959, p. 59.

Bechtel endorsed the project but the cost of project facilities was estimated to be from 4 to 8.4 percent greater. The state estimated the cost of the Oroville Reservoir complex at $418.6 million while Bechtel submitted a $434.4 million figure.[425] The California Aqueduct cost was estimated at about $891.2 million by the state and $978.9 million by Bechtel, for a comparative total cost of $1.6 v. $1.7 billion (including interest only during 30-year construction period). All of these costs were computed with a 2.5 percent interest rate;[426] No allowance was included by the proponents or the evaluators for escalation of construction cost or interest rates; bond prices presently range up to 5 percent.[427] Nor did either report include the cost of a Delta transfer facility, "... Because of the many complexities and uncertainties concerning both the physical features of the Delta Cross Channel and its relationship to other possible developments in the Delta region.... "[428]

Appendix B of the Bechtel report consists of a "Feasibility of Financing the Feather River Project" by a consortium of three financial firms. A few interrelated points concerning water demand, economic feasibility, and to some extent salinity control, appear in the review. Water demand is somewhat related to price. An artificially low price will create artificial demand which will require, of course, (artificial) planning for larger storage and delivery facilities. Conversely, a high projected water price may force the project, at any size, out of the market. A previous discussion illustrated the lack of analysis for the proposed irrigable land's ability to pay.[429] Similarly, the demands for Feather River Project water were based on a nebulous "ultimate" need equal to the required cost, whatever it might be. The main tenor of the state's reasoning is reproduced herein:

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[425] Bechtel Corporation, Report on the Engineering, Economic and Financial Aspects of the Feather River Project, (San Francisco) December 31, 1955. pp. 111-120.

[426] Ibid., pp. 111-112.

[427] Ibid., pp. 111-119. The bonds authorized by the voters carried a 5 percent ceiling, in 1969 the voters authorized the state to raise its borrowing rate to 7 percent. Gill, "The CWP and its Critics," in California Water edited by Seckler, p. 17.

[428] Ibid., pp. 111-112.

> It is believed that the cost of water will not be a limiting factor in ultimate development of the water resources of California.... It is indicated that urban communities will always be able and willing to pay the cost of water to meet their municipal needs. Furthermore, it is considered probable that under pressure of future demands for agricultural produce, the water necessary for a greatly expanded irrigation development will be provided, at whatever cost may be required.... Many works

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[429] See the discussion accompanying N. 378 Supra.

> financially infeasible today will undoubtedly be financed and constructed in the future....[430]

An economic analysis by the Stanford Research Institute contained in the Bechtel Report took exception to the above and it concluded:

> Planning for the Feather River Project would be greatly facilitated by a determination by proper authority of the amounts of water to be allocated to each service area and be establishing a definite price policy for water sales. Further detailed study of these matters will be required for more realistic estimates of probable water sales and for estimates of the financial outcome of the project.[431]

Undaunted by such responsible, though subdued, criticism DWR Director Harvey O. Banks stumped up and down the state with missionary zeal selling the project with the following exemplatory culpable statements:

> Today, the 14,160,000 people of the State are using some 22,000,000 acre-feet of water for all purposes - agriculture, domestic, industry, sanitation, recreation, power, and salinity control. That represents an overall statewide use of one and one-half acre-feet per person each year. If that rate is to continue, and all evidence points to an increased

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[430] DWR, Water Utilization and Requirements of California (preliminary draft), October 1954. Cited in Neil T. Houston and William Bredo, Stanford Research Institute, "Demand for Water in Service Areas of the Feather River Project," November, 1955, p. 16. Appendix A of Bechtel, Report on Feather River Project.

[431] Houston, "Demand for Water," p. 17. Appendix A of Bechtel, Report on Feather River Project.

> rate of use rather than a static rate - California must develop new water supplies of about 750,000 acre-feet each year. Are we developing a firm new water supply at that rate? The answer is a definite NO![432]

And,

> We must build and answer questions later...final answers to many of our most perplexing questions must be derived from the construction and operation of our first State project....Had we waited until we thoroughly debated and convinced everyone of the merits of flying before the first airplane was built, we still would be earthbound.[433]

These statements plus those used in support of the California Water Plan[434] created a false need for water development in the minds of most laymen. There is little correlation between two brothers launching themselves from a sand dune and the irreversible commitment of billions of dollars of public funds. Similarly, the 1 1/2 AF/capita/annum is not even remotely related to the agricultural, salinity control or power uses of water in the state. Agriculture uses over 90 per cent of the developed water supply of the state and it will still use over 80 per cent with ultimate development to supply the national and world markets, regardless of the state population.[435] The expansion of irrigation in this state is related to available land and water within the development price set by national and world demand for foodstuff - not the state's population. Yet, it is difficult to censor the Director when the top official in the state, Governor Pat Brown, promoted the project with the following over-simplified statement, "It is better to have water with problems than problems without water."[436]

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[432] Harvey O. Banks, Department of Water Resources Director "The Urgency of Statewide Water Development" before Natural Resources Committee, California State Chamber of Commerce, San Francisco, California, August 15, 1957.

[433] Harvey O. Banks, Department of Water Resources Director "The Program of the Department of Water Resources," Fall Conference of the California Section of the American Water Works Association, San Diego, California, October 25, 1956. Within one year of the implementation of the federal soil bank program (1956) California farmers lined up to receive (1957) over $15 million to take 259,686 acres out of production. McGanhey, Economic Evaluation of Water, p. 57. In 1970 California farmers received $131.9 million in subsidies. Legislative Analyst, Water Resources Planning, p. 19.

[434] Supra., Ns. 389-390.

The light of the reservations expressed by the Stanford group above and other academicians[437] was overwhelmed by the promoters of the project. The 1957 Legislature appropriated $25,190,000 to begin construction work on relocation of the Western Pacific Railroad and the Feather River Highway to make room for Oroville Reservoir.[438]

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[435] DWR, Water: *California's Challenge and Opportunity* unnumbered report (1967), p. 14.

[436] In George Ballis, *The California Water Plan - An Evaluation* (Washington, D. C.: Public Affairs Institute; 1960), p. 2.

[437] Gill, summarizes rather well the responsible economic criticism of the project in "The California Water Plan and its Critics," pp. 19-21. Hirshleifer seems to be the leading critic with participation in three co-authored papers, the most recent is Jack Hirshleifer, James C. DeHaven, and Jerome M. Milliman, *Water Supply: Economics, Technology, and Policy*, (2nd ed. Chicago: The University of Chicago Press, 1960). See also Bain, Caves, and Margolis, *Northern California Water Industry*. See also discussion of Ackerman N. 449, *Infra*.

Alternative Aqueduct Systems Report - 1959

DWR continued its intensive engineering investigations and economic development which culminated in a report, Investigation of Alternative Aqueduct Systems to Serve Southern California. Identified as Bulletin No. 78, this document was published in final form in December, 1959 after the Legislature had approved the Burns Porter Act. The bulletin identified the final aqueduct route which was eventually constructed and it carried the economic analysis discussed below.

The preliminary edition published in February, 1959, carried a favorable cost-benefit ratio of 1:2.35. Each dollar spent will represent an economic benefit of $2.35. Usually a cost:benefit ratio is used to ascertain the direct economic benefit of each dollar spent. For example, if $1 million spent on flood control returns $2 million in flood control over the life of the project this element would carry a 1:2 cost:benefit ratio. The 2.35 benefit in the ratio reproduced above was based on the difference between the cost of the project benefits and the cost of the next best cost alternative. For example, if desalinization was the cheapest alternative to the project and it cost twice as much as the project the favorable cost benefit would be listed as 1:2. This method assumes an economic demand at least as great as that necessary for the project facilities and many economists take exception to such an analysis.[439]

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[438] DWR, California State Water Project, Volume I History, Planning and Early Progress. Bull. No. 200, November, 1974.

The financial and economic analyses chapter of the December report has several baseline assumptions that should be reproduced, the first of which is:

> The capital cost of storage facilities supplying the Delta, such as Oroville Dam and Reservoir and proposed Delta improvement works were not included in the cost allocation. However, an estimated unit cost of water in the Delta at the intake to the aqueduct system of $1.00 was assumed in the analysis for study purposes.[440]

Using 1955 construction cost and a 2.5 per cent interest rate, Bechtel had estimated the Delta charge for Oroville Reservoir water at $3.60 per acre-foot. The use of a $1.00 figure is explained away in the following passage:

> The possible variations of any future increase in cost of water in the Delta because of necessary augmentation in supply thereto to meet the continuing demands of the aqueduct system were not reflected in the analyses. As to possible future construction above the Delta to meet increased demands, is [sic] is estimated that a substantial period of time would elapse before augmentation would be required, and that the maximum effect on cost of water in the Delta would

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[439] Hirshleifer, Water Supply: Economic Policy, p. 350.

[440] DWR, Alternative Aqueduct Systems, p. 133.

> neither be substantial nor adversely affect the conclusion reached herein.[441]

In the opinion of the researcher, it is difficult to give credence to any of the water cost figures contained in the report due to the offhand treatment of water at the Delta for $1.00 per acre-foot. To be sure, there was and still is surplus, natural outflow from the Delta, but projects sized for "ultimate" development at cost of billions should be planned with cost figures closer to reality, not rounded off assumptions.

The bulletin side stepped the issue of water cost while at the same time assuming full water cost is the basis for calculating water demand as the following incongruent statement indicates:

> *The full cost of water at the main aqueduct involved in delivering water to each service area, including full recovery of capital cost with interest, is the proper basis for estimating economic demands for supplemental water for purposes of aqueduct system selection and preliminary design*. . . . At the present time the pricing schedule for water to be delivered under the San Joaquin Valley-Southern California Aqueduct System (California Aqueduct) has not been nor can it be now established. It is not the purpose of this investigation to establish a pricing schedule but rather to estimate the future demand for water by areas on a reasonable basis. The assumption employed is believed to result in conservative estimates, particularly with respect to the development of and demand for water by irrigated agriculture.[442]

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[441] *Ibid.*, p. 133. See also pp. 97-98.

[442] *Ibid.*, p. 68, Emphasis original.

The "conservative" estimated project water cost used to project the water demands are reproduced in Table XV along with the price the customers are now paying. The pricing policy employed, which accounts for the various prices, is explained in a subsequent discussion.[443]

Once the "demand" was established, the planners could project the sizing of alternative facilities, and the attendant capital financing and operation cost. The most favorable alternative, Aqueduct System B, had the cost and revenues outlined in Table XV. Capital cost, including interest, was estimated (with 3.5 per cent interest) at a staggering $4,094,000 which did not even include the cost of Oroville Reservoir or the Delta facilities. "The costs used in the financial analysis represent all those that would be incurred in construction of the main aqueduct facilities south of the Delta.... The capital cost of storage facilities supplying the Delta, such as Oroville Dam and Reservoir and proposed Delta improvement works were not included in the cost allocation."[444]

To include the cost for these facilities would increase the estimated price which would require either a replanning effort with a scaledown demand or a rejuggling of prices to equate the higher

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[443] See discussion accompanying Ns. 487-494 Infra.

[444] DWR, Alternative Aqueduct Systems, p. 133.

TABLE XV

COMPARISON OF 1959 ESTIMATED WATER COST AND PRESENT ACTUAL COST (DOLLARS PER ACRE-FOOT)

Service Area	1959 Estimate[a]	1974 Payment[b]
Kern County		
Upper Antelope Plain	16	25
Avenal Gap to Pumping Plant In-III	10	25
Pumping Plant In-III to Plant In-IV	16	25
Pumping Plant In-IV to Plant In-VI	24	25
San Luis Obispo	26	253
Santa Barbara	27	132
Ventura County	49	83
Antelope-Mojave	38	82
Whitewater-Coachella	52	85-104
Southern California Coastal Plain and Coastal San Diego County	43	88-96

[a] DWR, Investigation of Alternative Aqueduct Systems to Serve Southern California, p. 68 and plate 2.

[b] DWR, Bulletin No. 132-74, p. 165.

prices to actual. As illustrated in Table XV, neither was done; the service areas found out much later after they were under contract the price they would have to pay.

The 1959 bulletin underwent a vigorous review by an independent, ad hoc, Board of Consulting Engineers appointed by Director Banks. Originally, the Board was asked to review a broad range of aspects dealing with the project. Restrictions were virtually nonexistent; the Director stated ". . . . You are free to devote whatever time you find necessary. . . . Your review and report should include consideration of the following elements of the problem and any others you deem significant."[445] The "following elements" consist of thirteen broad range points.

On February 26, 1959, the DWR published a preliminary summary of the aqueduct routing study ". . . which the Board had declined to approve."[446] Subsequently, Director Banks asked the Board to confine its review to:

a. Determine probable future water requirements

b. Determine probable time when water from Northern California will be required

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[445] In Adolph J. Ackerman, "Minority Report, Feather River-Southern California Aqueduct," December 31, 1959 in DWR, Alternative Aqueduct Systems, pp. 40-41: These Majority and Minority Reports were also filled in the California Legislature. Assembly Daily Journal, March 8, 1960.

[446] Ibid., p. 38.

c. Designate areas to be served by the aqueduct

d. Select the most favorable aqueduct system.[447]

Bulletin 78 carried two reports by the Board. The favorable Majority Report carried the following reservation:

> It will perhaps be self-evident, but we wish to emphasize that the studies underlying Bulletin No. 78, although intricate and voluminous, are sufficient only for the accomplishment of this limited objective: the selection of the most favorable aqueduct system for the conduction of water to areas of need in Southern California. Having ascertained the most favorable system, the Department must now subject it to intensive additional studies of various kinds--engineering, geological, economic, and financial....[448]

A dissenting opinion was filed by Adolph J. Ackerman in a detailed Minority Report. The contents are summarized with the following statement found within, ". . . . I do not question the sincerity or intentions of the engineers who have planned the Feather River-Southern California Aqueduct project. I do, however, seriously question the soundness of their proposals."[449]

The detailed studies called for were never consummated in the planning period. The failure by the Board to approve the preliminary Bulletin 78, the limitations contained in the Majority Report, and the responsible questions raised in the Minority Report failed to bear fruit. The intensive eight-year drive for the project culminated with the passage of the 1.75 billion California Water Resources Development Bond Act (Burns-Porter Act) by the 1959 session of the Legislature.

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[447] DWR, Alternative Aqueduct Systems, p. 19.

[448] Ibid., p. 19.

[449] Ibid., p. 35; Emphasis original.

MWD (Metropolitan Water District of Southern California) signed a contract with DWR to receive 1.5 MAFA on November 4, 1960; and four days later, the electorate approved the issuance of the bonds with a slim 173,944 vote margin out of a total 5,842,712.[450]

The divergence of this thesis into a cursory review of the early physical and economic-financial planning of the California Water Project has three purposes, expressed here as a summary.

1. The Delta problems and facilities were not included in the economic planning for the project.[451]
2. The project was well underway long before the voters authorized the issuing of bonds in 1960 to finance the project which had been authorized in 1951.
3. Statements made by state officials in regards to water demands were not founded on a sufficient level of detail, were misleading, and bordered on bad faith.

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[450] Cooper, Aqueduct Empire, p. 241.

[451] Delta problems and facilities were considered separately as discussed in Chapter VII.

SALINITY CONTROL POLICY FORMATION

State planners gave considerable attention to salinity control in the fifties as part of the barrier proposal investigations which is presented in the next chapter. This discussion will consider salinity control as it appears in the 1951, 1955 and 1959 reports analyzed in the previous section.

Owing to the fact the Bureau's Shasta Reservoir was diligently maintaining salinity control as it had been for seven years (since 1944), the state engineers assumed in their calculations for the 1951 Report, "...Mandatory releases were made from the Shasta and Folsom Reservoirs to meet the requirements of the Central Valley Project... including... salinity control to Antioch (4,500 second-feet into Suisun Bay)."[452]

Not discounting this basic tenor was in tune with the multitude of statements made by the Bureau, there is room to question the assumption. The exponential relationship between exportation and Delta outflow had by this time been identified.[453] As exports increase, so must Delta outflows. Increased Delta exportation by the state project would necessitate increased outflows. Did the state assume the Bureau would maintain all the salinity control with both projects exporting? A positive response is indicated in the report but as discussed in the next chapter this unanswered and vital question rises many times in the early planning period.

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[452] State Water Resources Board, Feasibility Report (1951) p. 18.

[453] Supra., N. 289.

The 1951 report relates salinity control to the CVP four times and only once to the Feather River Project.[454] This latter reference is herein reproduced:

> It is apparent, therefore, that large reservoir capacity is required to regulate the magnitude of such erratic Feather River flows, to prevent flood damage and to conserve the waters for beneficial purposes; namely, domestic, irrigation and industrial supplies, navigations, salinity control, production of electric power, and other uses.[455]

The credibility of Director Banks' testimony has been seriously questioned elsewhere,[456] but it is of interest to note the following testimony given to a state Senate committee in 1958:

> The reports of the Department of Water Resources in 1951 leading to the authorization of the Feather River Project recognized the water requirements for consumptive use and salinity repulsion in the Delta.[457]

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[454] State Water Resources Board, Feasibility Report (1951) p. 15, 18, 21, 22.

[455] Ibid., p. 11.

[456] See the quotes accompanying Ns. 403, 404, 432 and 433 Supra.

[457] Harvey O. Banks, Department of Water Resources Director "Statement before Senate Interim Committee on Proposed Water Projects," January 22, 1958.

The Legislature, it will be remembered, authorized the project after the submission of the 1951 project report. There are some interesting aspects relating to the 1951 Legislative authorization of the Feather River Project and salinity control. Voters in 1933 endorsed the $170 million Central Valley Project consisting of Shasta Reservoir, and other basic features of the project such as Friant Dam. The passage of the CVP Act of 1933 authorized the state Water Project Authority to issue revenue bonds to the amount of $170 million, less any money made available by the Federal Treasury. The power to issue the revenue bonds had in effect expired with the construction of the CVP by the federal Bureau of Reclamation.

The 1951 authorization: (1) amended the Central Valley Project Act of 1933 to include the Feather River and Sacramento-San Joaquin Delta Diversion Projects "... As units of the Central Valley Project separate and apart from any or all other units thereof...", and (2) it removed the financial limitation by availing unlimited revenue bond financing for any purpose which the Water Project Authority is authorized to undertake.[458]

While the author lacks the legal expertise to seriously question the legality of the legislative action, there seems to be room for suggesting a degree of aberration, if not the letter, certainly the intent, of the law enacted by the 1933 voters. The voters approved the 1933 bonds for specific units of the Central Valley Project as outlined in Bulletin 25 published in 1930.[459] Furthermore, Sec. 11207 of the California Water Code found under Part 3. Central Valley Project, clearly states "...Shasta Dam shall be constructed and used primarily for... [among others] salinity control in the Sacramento-San Joaquin Delta."[460] When the Legislature, some twenty years later, took the liberty to transfer the voter authorized financing program from the CVP to the SWP, it would seem, in rectitude, the project functions, to the extent possible, would also be transferred. This short "brief" is not based on known legal fact or knowledge but merely a thought or impression of the author.[461]

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[458] Supra N. 418.

An analysis of available water in the Delta for state exportation is found in the Bechtel review of the state's 1955 financial report. Both the 1955 report and the Bechtel review utilized a 4,500 cfs outflow which the Bechtel research team judged as conservative with the following statement:

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[459] D. P. W., State Water Plan, Bulletin No. 25, (1930). Ns. 207 and 223 Supra.

[460] This code pertains, of course, to the state envisioned CVP; it is not ruling on the present CVP.

[461] The reasoning outlined above no doubt runs countercurrent to that of the State Supreme Court as expressed in N. 485 Infra.

> The minimum flow requirement for repulsion of salinity encroachment has been the subject of a great deal of investigation and study by others in recent years. The results of these investigations have shown minimum values required for this purpose ranging from 1,100 cfs to 6,000 cfs under various conditions. The more recent figures for average conditions range between 2,500 cfs and 4,500 cfs. In the Feather River Project studies, both the State and Bechtel used a value of 4,500 cfs which is conservative. Precedent for the use of 3,300 cfs presently exist (1) in that the BOR is currently using 3,300 cfs as the requirement for salinity repulsion in the operation of the Central Valley Project...[462]

As project exports from the Delta increase arithmetically, salinity control releases increase exponentially. A previous discussion pointed out this dynamic relationship was known as early as 1951.[463] Understanding the export/control relationship discredits the assumption in the Bechtel report that the projects would maintain an adequate flow with 4,500 cfs with the added state project pumps operating. The fallacy is twofold: the outflow would have to be increased with greater exports, and the CVP was not apt to be responsible for all of the 3,300 cfs outflow with both projects exporting.

The overly optimistic assumptions stated above were carried a third step. It will be pointed out in the next chapter that the state was planning, at this time, to construct a modified barrier plan to maintain Delta export water quality with an outflow of 500 cfs.[464] Bechtel assumed in its 1955 review that the state planners assumed the Bureau would continue the full 4,500 cfs outflow in the face of the barrier (Biemond Plan). The 4000 cfs surplus would be salvaged by the state for export.[465]

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[462] Bechtel Corporation, Report on the Engineering, Economic and Financial Aspects of the Feather River Project, December 31, 1955, pp. II-14, II-15.

[463] See discussion accompanying N. 288, Supra.

When one considers the immensity of Bechtel's task in reviewing the complex state project containing obvious problems, in so short a time, it is easy to understand the oversight of a not so obvious problem. Assumptions were necessary and most had been established by state engineers. The review team just didn't have the time to investigate them. Acceptability of the Bechtel review as an endorsement of the state project by the reader should be cautioned by the short-comings discovered in this analysis.

In the last major report before voter approval of the financial program, DWR investigated the broad range of aqueduct routes through southern California. No attention is given to salinity control in the Delta, the report was, "...Directed principally to the single objective of determining the optimum aqueduct system to serve the long-range water needs of the areas to be served thereby."[466]

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[464] Bechtel, Report on Feather River Project, p. II-16.

[465] Ibid., p. II-16.

While the report may not have discussed the source of water quality control in the Delta, the following statement in the Water Quality Considerations chapter indicates a barrier would be constructed:

> Based upon projections of the factors influencing the mineral quality of waters entering the Sacramento-San Joaquin Delta, an estimate was made of the probable long-term maximum mineral content of northern California water to be diverted therefrom for conveyance to the south, which is also presented in Table 13. [TDS-200 ppm, Chloride-30 ppm]. This estimate of the future quality of northern California water is predicated on the eventual construction of works in the Delta to separate saline return irrigation waters. Should these works not be constructed, an increase in the concentration of mineral constituents shown in Table 13 may be expected.[467]

An independent review filed at the beginning of the bulletin states, "This conclusion may be on the optimistic side, but in any case, would be invalid if the improvements upstream in San Joaquin Valley and in the Delta were not provided."[468]

It should be pointed out that the Bureau by this time had established rather firmly their policy on limited salinity control.[469] It was clear the state would have to play a major, if not total role in maintaining its share of Delta protection. Yet, the estimated water cost in the report does not include a realistic cost of either Oroville Reservoir or the Delta facilities. Rather $1.00/AF is assumed in the analyses "...for study purposes."[470]

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[466] DWR, Alternative Aqueduct Systems, transmittal letter from Harvey O. Banks to Governor Pat Brown, p. 4.

[467] Ibid., pp. 81-82.

[468] Board of Consultants, "Report to Director, DWR, on Alternative Aqueduct Systems to serve Southern California", September, 1959, in DWR, Alternative Aqueduct Systems, p. 22.

The next chapter will discuss the various degrees of salinity control contemplated with the barrier proposals which were being investigated concurrently with the studies discussed above. This brief section is presented here as an accompaniment to the analysis of the development of the State Water Project as contained in the 1951, 1955 and 1959 reports. It may be deducted that salinity control was, in these bulletins, considered a CVP function. Little attention is given to the overall planning of the State Water Project for either the cost or maintenance of salinity control.

FINANCIAL STATUS AND POLICY

Four days prior to the historic voter endorsement of the Burns-Porter Act on November 8, 1960, the Metropolitan Water

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[469] Supra, N. 301.

[470] DWR, Alternative Aqueduct Systems, p. 133.

District of Southern California (MWD) committed itself to receive 1.5 MAFA (million acre feet/annum) of the State Water Project water.[471] This figure was augmented to 2.01 MAFA when the U. S. Supreme Court ruled in favor of Arizona in the Colorado River controversy thereby reducing California's diversions from this source.[472] By 1964, 4.2 MAF was committed and the total yield of the project, 4.23 MAF, was contracted when the last of 31 contracts were signed on June 26, 1968.[473] Project deliveries are scheduled to build until they reach this figure in 2016.[474]

Water projects need substantial amounts of supplemental cash in their early life to build the storage and distribution works. Once operative, project customers can be counted upon, in various degrees, to furnish funds in return for the water and power delivered. The primary sources of construction funds for the SWP are: (1) the $1.75 billion water bonds authorized by the Burns-Porter Act and the voters of the state, (2) the California Water Fund created by annual appropriations from the state's oil royalties from the off-shore oil and gas fields and (3) revenue bonds.

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[471] DWR, *The California State Water Project: Summary: 1969*, Bulletin No. 132-69 (Appendix C), p. 7.

[472] A Colorado River Compact was executed between the seven states in the basin in 1923, and in 1931 the California diverters agreed among themselves as to their individual entitlement of the California share. Between the two agreements, MWD is entitled to only .55 MAFA. Historically, the District has diverted 1 MAFA, the full capacity of the Colorado River Aqueduct, but .45 MAF of this amount is surplus water. And it was this "surplus" water over which the two states litigated. The controversy entered the U.S. Supreme Court in 1952 and it emerged in March, 1964. California was limited to 50 percent of the surplus waters; surplus being all that over 7.5 MAF entering the lower Colorado Basin: Colorado River Board of California, *California's Stake in the Colorado River*, June, 1969, pp. 14, 15. When the BOR Central Valley Project is completed in the mid 1980's and the upstream diverts continue to develop all of their 7.5 MAF there will be little or no surplus in the Colorado River for any of the California users and diversions will be cut to level of the entitlements.

[473] DWR, Bulletin No. 132-70, p. 7.

[474] DWR, *The California State Water Project in 1973*, Bulletin No. 132-73, p. 24.

The $1.7 billion figure of the Burns-Porter Act bears little resemblance to the cost of the project; it represents the maximum figure the Legislature felt the voters would approve.[475] The voters of the state were misled, perhaps by a uninformed press, into thinking this was the total cost of the project. Hirshleifer states the undertaking, prior to voter approval, was repeatedly referred to as a $1.75 billion project.[476]

Presently the construction cost of the complex is estimated to be (through 2035) $2.98 billion.[477] Interest cost of the general obligation water bonds and power related revenue bonds is estimated at $3.22 billion.[478] The total of these figures yields a $7.2 billion price tag. It should be pointed out the financial cost would be higher without the California Water Fund, this reimbursable fund is interest free.[479]

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[475] Cooper, Aqueduct Empire, p. 228.

[476] Jack Hirshleifer, Water Supply: Economic, Technology and Policy, p. 338.

[477] Of this figure, $2.2 billion has been spent; the remainder includes $219 million for the Peripheral Canal plus other features. DWR, Bull. No. 132-73, pp. 64, 65.

A few years after the passage of the Burns-Porter, construction cost grew beyond the capabilities of the bonds and the California Water Fund, so the new DWR Director, Bill Warne, and Governor Brown cast about for supplemental funds to seize upon the 1933 authorized and 1951 reauthorized Central Valley Project revenue bonds.[480]

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[478] Ibid., pp. 66, 67.

[479] Letter from Robin R. Reynolds, DWR District Engineer, to John M. MacDiarmid, September 12, 1973. Also, nonreimbursable recreation funds of $5 million annually are granted from the state's tideland oil and gas revenues to be used for: (1) repayment of construction cost allocated to recreation and fish and wildlife enhancement and (2) for costs of acquiring lands for recreation developments associated with the project. DWR, Bull. No. 132-73, p. 74. Over 95 percent of the construction cost of five small reservoirs in the headwaters of the Feather River (above Oroville) will be financed by nonreimbursable funds charged to recreation, pp. 91, 72, 73. The $5 million annual appropriation is to terminate in 2035 but according to the DWR, the funds "...will continue indefinitely in the full amounts presently provided by law....In the past, the Legislature has acted to both decrease and increase such annual appropriations and may exercise its prerogative to do either again at any time in the future." The California State Water Project in 1970, Bulletin No. 132-70, p. 54. It is instructive to note the Davis-Dolwig Act of 1961 declared recreation as a responsibility of the state and the State General Fund. The lead author of the act, Assemblywoman Paulene Davis, represents the sparsely settled district in which the five recreation reservoirs are located. One lake, Lake Davis, carries her name.

[480] See text accompanying Ns. 223, 420 Supra.

Part of the increased need was due to an enlargement of the project to compensate for the Metropolitan Water District's water lost to Arizona in the landmark California vs. Arizona litigation over the Colorado River. However, it should be noted the decision was handed down on March 9, 1964;[481] the MWD 0.23 MAF increment was signed in September, 1964;[482] a suit testing the legality of the bonds was consumated in 1963.[483] Thus, the revenue bonds were issued before the sequence of events that led to the enlargement of the project.

According to Rogers and Nichols, a great deal of controversy greeted the DWR's announcement to sell these revenue bonds.

> ...There was a great outcry in the press by those who felt the Department of Water Resources was breaking faith with the voters of the state who had just authorized the $1.75 billion dollar general obligation bond issue. They had been led to believe that the general obligation bonds, together with other state funds, would be sufficient to construct the project. It was also feared by financial experts that a serious legal conflict would arise as between revenues to secure the general obligations and those necessary to secure the revenue bonds. Any payment of revenues toward satisfaction of the revenue bond obligation appeared illegally to deprive

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[481] See text accompanying N. 472, Supra.

[482] DWR, Bull. No. 132-1970, Appendix C, p. 7.

[483] See text accompanying N. 483, Infra.

> general obligation bonds of the revenue and security which previously had been pledged.[484]

The California Supreme Court set aside these questions but not the unrest when it endorsed the legality of the bonds.[485]

Project contractors are scheduled to repay all cost except for the self-liquidation revenue bonds and state and federal grants previously presented. A brief discussion is in order to point out the sensitive relationship between unplanned added cost and the repayment program, thereby setting the stage for an evaluation of the economic impact of increased salinity control found in the summary chapter.

In the mid-50's when the project planners were developing their repayment plan and gathering project support, Director Banks indicated the repayment rate would be based on the users ability to pay.[486] Repayment principals contained in the historic Burns-Porter Act of 1969 leave no doubt that the Legislature did not agree with the Director. Project beneficiaries are counted on to pay a substantial portion of project cost.[487]

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[484] Harold E. Rogers and Alan H. Nichols, Water for California, (San Francisco, California: Bancroft-Whitney, 1967), Vol. I, pp. 103-104.

[485] Warn V. Harkins, 60 Cal. 2d 579, 35 CR 601, 387 P 2d 377 (1963) in Ibid., p. 104.

[486] Harvey O. Banks, Department of Water Resources Director, Statements before the California Legislature. Subcommittee on Financial and Economic Policy for State Water Projects of the Joint Committee on Water Problems, May 15-16, 1958.

Soon after the passage of the act Governor Brown came forward with his statement of Contracting Principals of January 20, 1960 containing the requirements outlined in the Burns-Porter Act.[488] The statement is lengthy and complex; a few important elements will be examined.

The foremost consideration is water rates are established to return "...all cost of project operation, maintenance and replacement, all principal and interest on (1) bonds, (2) expenditures from the California Water Fund [sic], and (3) other monies used in the construction of the project work".[489] Nonreimbursable cost from the state and federal treasures such as wildlife enhancement and flood control are not included in the rate structure.

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[487] Cal. Water Code. Sec. 12937(b) and Sec. 12912(b) Water Contractors will account for 80 per cent of project repayment, power customers 13 per cent, recreation 3 per cent, federal government 1 per cent, and others 3 per cent: William Gianelli, Director, DWR, "Financial Status of the State Water Project in 1973", before the Assembly Committee on Water, California Legislature, February 20, 1973.

[488] Rogers and Nichols, Water for California, pp. 83-90.

[489] Ibid., p. 86. The authors are wrong on one significant point. The California Water Fund is maintained by annual appropriations of up to $25 million from the state's tideland oil and gas revenues. Thus far, $232 million has been allocated and DWR estimates this figure will grow to $1.3 billion. The full amount will be repayed--WITHOUT INTEREST, DWR, Bull. No. 132-73, pp. 64, 65.

The total annual unit charge for each of the 31 contracted customers is presented in Table XV. The calculation of the rate can be expressed with the following simplified equation:[490]

$$\text{Present annual rate} = \frac{\text{total 50 year actual and projected future Delta Water Charge + Transportation Charge}}{50}$$

The Delta Water Charge consists of a unit charge for each acre-foot of water the contractors are contracted to receive. The rate is generally constant whether the customer is located on the Feather River or in Orange County and they are set to return all reimbursable capital cost with interest (plus O & M cost) allocated to the conservation facilities.

According to the DWR:

> Project conservation facilities are defined as those facilities which conserve water, including Lake Oroville, Delta Facilities, additional conservation facilities and San Luis Reservoir and a portion of the California Aqueduct leading thereto from the Delta. Cost allocated to flood control and recreation and fish and wildlife enhancement are not paid under the water supply contracts. Both debits for power costs and credits for power revenues for project conservation facilities are included in the determination of the Delta Water Charge.[491]

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[490] Customers that use the water principally for agricultural use have a 75 year repayment period. This 75 is substituted for the 50 in the above equation.

[491] DWR, Bull. No. 132-72, p. 76.

Such a program has significant implications. First, project water users in the Sacramento River Basin must participate in the repayment of downstream facilities they do not use such as the San Luis Reservoir and the 66 miles of the California Aqueduct leading from the Delta to San Luis. Furthermore, all customers are obligated to pay for additional storage facilities needed before full deliveries are commenced in 2016 or additional deliveries should the DWR contract additional waters. In other words, at the end of or during the capital cost repayment period the DWR could contract additional water with present or new customers and distribute the cost of the additional storage facilities among all the contractors through the annual Delta Charge even though present contractors would not receive additional benefits.[492]

Even though the delta charge is computed and billed as the weighted mean of the actual past and estimated future charge, the amount has been escalating steadily. The implications are rather significant. An escalation from $11.21/AF in 1971 to $13.15 AF in 1973 represents a gain of $1.92/AF.[493] This $1.92 figure multiplied times 4.23 MAF, equals $8.1 million. Since most of the facilities charged to this account are constructed and in operation, or their estimated cost is included, this figure seems rather large. The upshot of this analysis is that the price of the project water is going up and so is the price to the consumer.[494]

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[492] Harvey O. Banks, "Repayment of Irrigation Cost under State Water Projects," before the Subcommittee on Financial and Economic Policy for State Water Projects, California Legislature, September 15, 1958. Federal statutes prevent this from happening to CVP customers. See text accompanying N. 305 Supra.

[493] DWR, Bull. No. 132-71, p. 157 and DWR, Bull. No. 132-73, p. 159.

The transportation charge in the repayment formula is computed the same way as the delta charge. The capital cost element is calculated with the proportionate use method; each contractor repays the portion of the cost allocated to the portion of the canal utilized to deliver its water. The operation and maintenance element receives the same treatment.

One aspect of the transportation charge deserves comment. As is the delta charge, the transportation charge is also escalating at an alarming rate. The capital cost component of the transportation charge increased over 25 per cent from $22.21/acre foot in 1970 to $27.96/acre foot in 1973 (8.33 per cent/annum).[495]

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[494] Customers of the project have retained two large accounting firms to review the DWR billing program and audit all transactions. William Gianelli, DWR Director, "Financial Status of the State Water Project in 1973," before the Assembly Committee on Water, California Legislature, February 20, 1973.

[495] DWR, Bull. No. 132-70, p. 226 and DWR, Bull. No. 132-73, p. 159. If in the 2 year period DWR anticipated the price would have to be escalated to $1.92 for the remainder of the repayment period then this writer deducts DWR's estimated cost in the remainder of the repayment period (if it were but 40 years) would equal $1.92 x 4.23 MAF x 40 years which equals a startling $324 million. Such an analysis is probably invalid as the Delta water charge was reduced to $12.68/AF in 1974, DWR, Bull. No. 132-74,

Similarly the operation and maintenance component of the transportation charge has increased almost 25 per cent for the same period and this cost is due to escalate even more due to the power requirement of the project. No amount of sensitive insight in the power rich fifties would have enabled the project planners to foresee a great rise in energy cost, but this increase in pumping cost will continue to swell the price of delivered water.

Project supporters boast about the power production of CWP and CVP reservoirs but seldom, if ever, do they mention project power requirements.[496] By 1991 the state project will be consum-

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p. 165. However, the continuing overall escalation of the Delta Water Charge validates the deduction in the text above — the price of the project water is going up.

[496] DWR has been less than frank in publicizing the power production/power use aspects of the project. The following statement by Director Gianelli is rare, "Right now we are generating much more energy than we need. We can sell this off, but in a few years we are going to need much more water energy than we will be able to produce. Then we will have problems." "State Water Project Takes a Symbolic Step," San Francisco Examiner, May 15, 1973, p. 10. The usual pattern is to publicize the Project's power production as a great benefit to the people--without mentioning the power requirements of the project or the customers (for local distribution). Examples of this can be found in the opening pages of the annual reports published as the 132 series. SEE: Bulletin 132-1969 (Appendix C), p. 4, back cover; Bulletin 132-70, pp. iii, x; Bulletin 132-71, pp. iii, xi; Bulletin 132-1971 (Appendix C), pp. 2, 4, back cover; Bulletin 132-73, p. iii, x, 41. Former Director Gianelli was fond of supporting all reservoirs due to their hydroelectric components. "East Side Canal: A Water Project That Never Was," The Sacramento Bee, February 4, 1973, pp. P1, P4. Other zealous supporters of the project have used the same tack. A prime example is an article "Bridging a Generation Gap," in the spring 1974 issue of

Aqueduct published by the Metropolitan Water District of Southern California. The author applauds Oroville's 2.3 billion average annual output and the electricity that will be generated by Los Angeles' Castaic Power Plant with project water, but he fails to mention, every cubic foot of water that falls through the Castaic turbines must be lifted 1,000 feet up the San Joaquin Valley plus 1,938 feet up the north face of the Tehachapi Mountains. Other single objective organizations duplicate the pattern. See the following articles in the January 5, 1974 issue of the California Farmer: "Irrigation and the Truth About Dams," editorial by Jack Pickett, p. 6; "Good and Bad News About New Melones," p. 16; "Water Developers are Real Conservationists," p. 38. And in the April 6, 1974, issue of the California Farmer, see: "Bad Rivers and Bad Politics". Some of the aforementioned articles endorse the need for all reservoirs, not just SWP dams, for"...cheap...clean...hydroelectricity." The Sacramento Bee(editorial, January 11, 1974) is equally biased in its presentation of the power production-use of the CWP and the CVP. An editorial, "More Emphasis on Water, Power Projects is Needed to Help Solve Energy Problem", bases its entire case on the fact that Oroville Reservoir generated 3 billion kilowatt hours of electricity in 1973. The author failed to mention (1) Oroville used .7 billion in 1973 to pump water back in the reservoir and (2) the gross figure was due, in part, to the extremely wet year with a high runoff. The estimated average annual generation is 2.1 billion kilowatt-hours: DWR, Bulletin No. 132-1972 (Appendix C), p. 6. The facilities only produced 2.6 billion kilowatt-hours in 1969 (DWR, Bulletin No. 132-70, p. 44) and 1.8 billion kilowatt-hours in 1972 (DWR, Bulletin 132-73, p. 41) two poor water years. The editorial page sells CVP reservoirs with the same theme "...Development of the clean hydroelectric power is in itself a compelling reason to go ahead on New Melones without further delay." "Full Speed Ahead, on New Melones," The Sacramento Bee, November 19, 1973. Also see comments by the Pacific Legal Foundation in, "Auburn Dam Proponents Hire Lawyers," The Sacramento Bee, November 16, 1973, p. B1. Incongruous with this staunch support, the periodical creates an ambivalent position with an adamant opposition to CVP power price increases. "Rate Increases for CVP Power Threatens Military, NASA Projects in North State," The Sacramento Bee, January 24, 1974, p. A1, "Hearing on Proposed Public Power Price Boost Show Need for Probe" (Editorial) The Sacramento Bee, July 18, 1973, p. B8. Do the journalists expect the federal treasury to furnish both expensive reservoirs and cheap electricity? Reservoir sites are not ubiquitous; all of the economical sites have long been utilized. CVP projects are economically justified on a basin wide basis. That is, new, expensive reservoirs are justified with surplus funds from the total CVP project to defray the cost of the reservoirs (Supra Ns. 304-

ing 13 billion kilowatt-hours, 20 per cent of which will be recovered by three California Aqueduct power plants plus the state's portion of castaic power plans. Deducting this 20 per cent plus the 2.1 billion kilowatt-hours/year production of the Oroville complex yields a project net power need of about 8.3 billion kilowatt-hours/year.[497]

The concern over the strain this requirement will create on the state's total power demand will be second place to where, in fact, this power is to come from. In addition to the project's primary and recovery production, power is furnished by (1) a Canadian Entitlement (300,000 kilowatts) (2) Bonneville Power Administration and (3) California suppliers. A substantial increase in power

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306). According to the Environmental Defense Fund and the Protect the American River Canyons Association, Auburn Dam was justified with a $39 million contribution from the CVP. "Auburn Dam: Conservationists Claim Cost Hidden," The Sacramento Bee, August 9, 1973, p. B1. The editors of the Bee should not expect projects such as Auburn and New Melones Dam without an increase in CVP power rates. One additional aspect of power use should be pointed out. Irrigators in California use a considerable amount of electric energy to distribute water and to pump groundwater, some of which is replenished by the projects. Agricultural activities account for 5.07 per cent of California's consumed energy; irrigators utilize 68 per cent of the electrical energy consumed by agriculture: Don Razee, "California Agriculture's Energy Story," California Farmer, February 16, 1974, p. 7. As this Thesis was being finalized to meet the statutory time limit the writer received Bulletin 132-74. It appears that the new Director is much more candid about the problem, a full four pages is devoted to power.

[497] DWR, Bull. No. 132-73, p. 37.

cost will occur after March 1983 when the Canadian entitlement will drop off. Additionally, the Bonneville rates will be renegotiated in 1974 and every five years thereafter.[498]

An additional ramification of the repayment mechanism merits examination. It will be remembered that the contractors' Delta Charges are not based on the amount of water they actually receive but the water they are contracted to receive. Two contractors, San Luis Obispo and Santa Barbara Counties were initially scheduled to receive 82,700 AFA by 1990.[499]

This water is reserved in the Delta and a portion of the California Aqueduct needed to deliver the allocation to the yet to be built Coastal Branch Aqueduct, is also reserved. To this cost, (Delta Water Charge plus a portion of the capital cost of the California Aqueduct), the counties are commited for the duration of the repayment period or the repayment of the general obligation bonds whichever is longer. All bonds should be repaid by 2035. Thus far the two counties have contributed $2.2 million.[500]

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[498] Ibid., pp. 36, 37.

[499] Ibid., p. 102.

[500] Gianelli, "Financial Status of the Project-1973," p. 7. This figure does not include the Delta Water Charge which has been postponed until 1980: Letter from Robin R. Reynolds, DWR District Engineer, to John M. MacDiarmid, September 12, 1973. By mid-1972 an unspecified number of contractors had paid $200 million without yet receiving any water; this represents a substantial per cent of the $332 million paid by contractors up to December 31, 1972. Gianelli, "Financial Status of the Project-1973," p. 12.

Before water can be delivered the two counties must authorize the 40 mile construction and assume the estimated $77 million debt of the Coastal Branch Aqueduct.[501] A stub from the California Aqueduct has been constructed to serve a contractor on the westside of the San Joaquin Valley; the San Luis Obispo, Santa Barbara portion would continue this stub to the common county line near Santa Maria.

The total estimated cost of water at the terminal of the Coastal Branch Aqueduct is $151/AF.[502] To this cost Santa Barbara would have to add $112/AF for a local distribution system to transport the water to the main area of need, the urbanized Santa Barbara Coastal Plan.[503] This M&I use could absorb the high cost if the water is necessary. Yet, there is a reluctance to import the water due to the high cost and the social disbenefit of growth inducement.[504] San Luis Obispo County on the other hand does not have as critical a water shortage and less expensive alternatives are available for the urban areas. Resultantly, the two counties have requested a delay in the construction of the Coastal Branch that was to go on line in 1980.[505] Nevertheless, both contractors are obligated to continue paying their allocated portion of the delta water charge and the transportation charge though they may never receive a drop.

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[501] Gianelli, "Financial Status of the Project-1973," p. 7.

[502] DWR, Bull. No. 132-74, Table B-21.

[503] Initially this added cost would be $243/AF but it will be reduced to $50/AF thirty years after construction. The $112/AF figure represents the average cost through the pay out period. Santa Barbara County Water Agency, Report on Program for Importation of State Project Water to Santa Barbara County prepared by Bookman and Edmonston May, 1970, p. VI-21.

[504] Letter from Robert M. Jones, Santa Barbara attorney, to John M. MacDiarmid, August 2, 1973.

No planner could have forecast the repayment problems or cost that have recently developed due to power cost or the repayment-delivery conditions in San Luis Obispo, Santa Barbara Counties. Certainly the DWR does not deserve blame for these unforeseen developments. However, these circumstances typify the problems associated with longterm commitments without recourse. Yet, the contractors were not forced to sign long term agreements and the voters of the state were not forced to approve the Burns-Porter Act. One is forced to ask, however, did they really know what they were doing?

This section outlines the repayment mechanism for the State Water Project. It further points out the contracting agencies of the SWP will probably be faced with an escalating price for water that is already very expensive. Additional storage features that may be needed for salinity control would raise the Delta charge considerably or tax the annual $5 million of the tideland oil and gas, wildlife enhancement fund. This point is considered further in Chapter IX.[506]

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[505] Santa Maria Times, June,29, 1973.

[506] See "Salinity Control, Who Pays?" and "Need for the Peripheral Canal."

CHAPTER VII

PHYSICAL SOLUTIONS TO THE CONTEMPORARY PROBLEM

> A great deal of thought had been given to these problems in the past four years. Nothing has been accomplished toward their solution. The most that can be said is that the lawyers have been getting clients in a better position to fight. Right here I would like to make a plain statement, and that is that the water problems of the San Joaquin-Sacramento Delta will never be settled in the courts. Enough money has already been spent on litigation to go a long way toward a solution of the problem.
>
> T. H. Means, 1924[507]

INTRODUCTION

Only after some fifty years does it now seem T. H. Means' portentous words have become partially obsolete. The unresolved question of Delta water rights and quality are now in the judicial process of resolving conflict. Simultaneously, the projects' operators are in the final design stage for a physical solution for transferring water across the Delta and protecting Delta water quality, though the level of protection is still in doubt. The concern expressed above over resources spent in litigation vs. the implementation of a solution will never be obsolete in the forever contemporary controversy of western water.

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[507] Supra, N. 133.

It has been pointed out in this thesis that in the early years of the salinity control controversy solutions resolved around physical features - first barriers and then reservoirs for low flow maintenance. Through the fifties the reservoir releases concept reverted back to barriers, then variations of the barriers and finally the peripheral canal in the early sixties. However, in this same general period events were set in motion for the implementation of institutional solutions for water quality maintenance. These institutional considerations now seem to be more significant than the various physical solutions. This chapter examines the contemporary physical solutions and Chapter VIII presents the institution controversy. The two topics are interrelated but they are separated for organization and presentation.

BARRIER PROPOSALS

Early schemes to separate fresh water from salt water in the Bay-Delta Estuary were developed to (1) capture the freshwater outflow for municipal and industrial use, (2) reclaim a major portion of the marsh lands for urban sprawl, and (3) create additional bay crossings for automobiles. These concerns were fueled by an accelerated post World War II population growth, and the multipurpose aspects of the barriers created widespread interest. Through the investigative period, however, the purposes listed above slowly dropped off; and by the time the Burns-Porter Act was passed in 1960, a barrier was recommended by DWR for capturing the Bureau's salinity control Delta outflows and transferring export water across the Delta without water quality degradation. It is important to realize that concerns for Bay Area growth problems provided the momentum for the barrier studies and that the final proposal, with project water transfer as the main purpose, was, in part, at the expense of the Bay-Delta Estuary.

Except for the first independent barrier studies by John Reber, John Savage and Charles Weber, the investigations were sponsored by three bills, The Abshire-Kelley Salinity Control Barrier Act of 1953, 1955 and 1957. A report was issued pursuant to each act.

This section discusses the barrier rebirth movement, describes the two most viable barrier alternatives, including the recommended plan, analyzes the Bay-Delta municipal water supply considerations in the study, and considers the thorny question of what DWR proposed to do with Shasta Reservoir salinity control Delta outflows once a barrier was implemented.

Rebirth

John Reber was the vanguard of the Barrier movement. He presented his independently developed plan in 1941. It envisioned several Bay crossings and reclamation of vast areas of shallow marsh land and it prompted the legislature to request the President and Congress to investigate the plan. A reconnaissance level review that drew little attention was filed by a Joint Army-Navy Board in 1947.[508] The Reber Plan was followed by two independently developed plans by John Savage and Charles Weber.

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[508] Water Project Authority, Report to the Legislature on Feasibility of Construction by the State of Barriers in the San Francisco Bay System, March, 1955. The Water Project Authority commissioned the Division of Water Resources and an independent Board of Consultants to conduct independent but coordinated studies

Surprisingly, a major opposition for a multi-purpose project was developed by the California Toll Bridge Authority. In September 1952, the Legislative Joint Committee on Water Problems held two days of hearings in San Rafael to discuss the barriers. A special meeting was called by the Toll Bridge Authority in Sacramento on the second day of the Joint Committee hearings. According to the Legislature, "At this meeting the Toll Bridge Authority authorized the immediate construction of the Richmond-Point San Quentin Bridge with a speed, alacrity and dispatch unique in the annals of the executive branch of State Government."[509] A potential major function of the barrier proposals was withdrawn.

Abshire-Kelley Salinity Control Barrier Act of 1953

The Abshire-Kelley Salinity Control Barrier Act of 1953 authorized $500,000 of nonreimbursable funds to the state Water Project Authority (WPA) to investigate the barrier proposals and evaluate additional alternate schemes. The WPA was specifically directed to study the barriers "...for reclamation, for salinity

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that were bound in the same report and presented to the legislature. Therefore, references to this bulletin will include the specific author of the text referenced. The text above is from the Board of Consultants, p. 6. See the text accompanying Ns. 307-309 Supra for an explanation of the WPA.

[509] California Legislature, Senate and Legislature, Joint Committee on Water Problems, 1953 Regular Session, Sixth Partial Report: Underground Water Depletion Problems West Coastal Basin and Central Basin, Los Angeles County and South Coastal Basin, Orange County; North San Francisco Bay Barrier; Sacramento River Seepage and Erosion Problems; Trinity River Division, Central Valley Project of California; Stock-Water Problems in Stong Creek Basin, p. 22.

and flood control purposes, and for the purpose of creating a supply of fresh water for irrigation, domestic uses, and related purposes."[510]

The Water Project Authority organized the investigation on two fronts. The State Division of Water Resources was authorized to implement the Abshire-Kelley directed investigation, and an independent five member board of consulting engineers was appointed to appraise the proposals. One of the Board's first official functions was to obtain the services of Cornelus Biemond, a Dutch engineer who had developed special expertise in the field with reclamation work in his country.[511]

Development of Alternatives

Initially, seven general barrier sites were developed. Figure 8 illustrates the Reber Plan; Figure 9 shows the alternative barrier sites; and Figure 10 portrays the Biemond or Waterway Plan.

As illustrated, the Reber and Weber plans are multipurpose in scope.[512] The other schemes do not incorporate tideland

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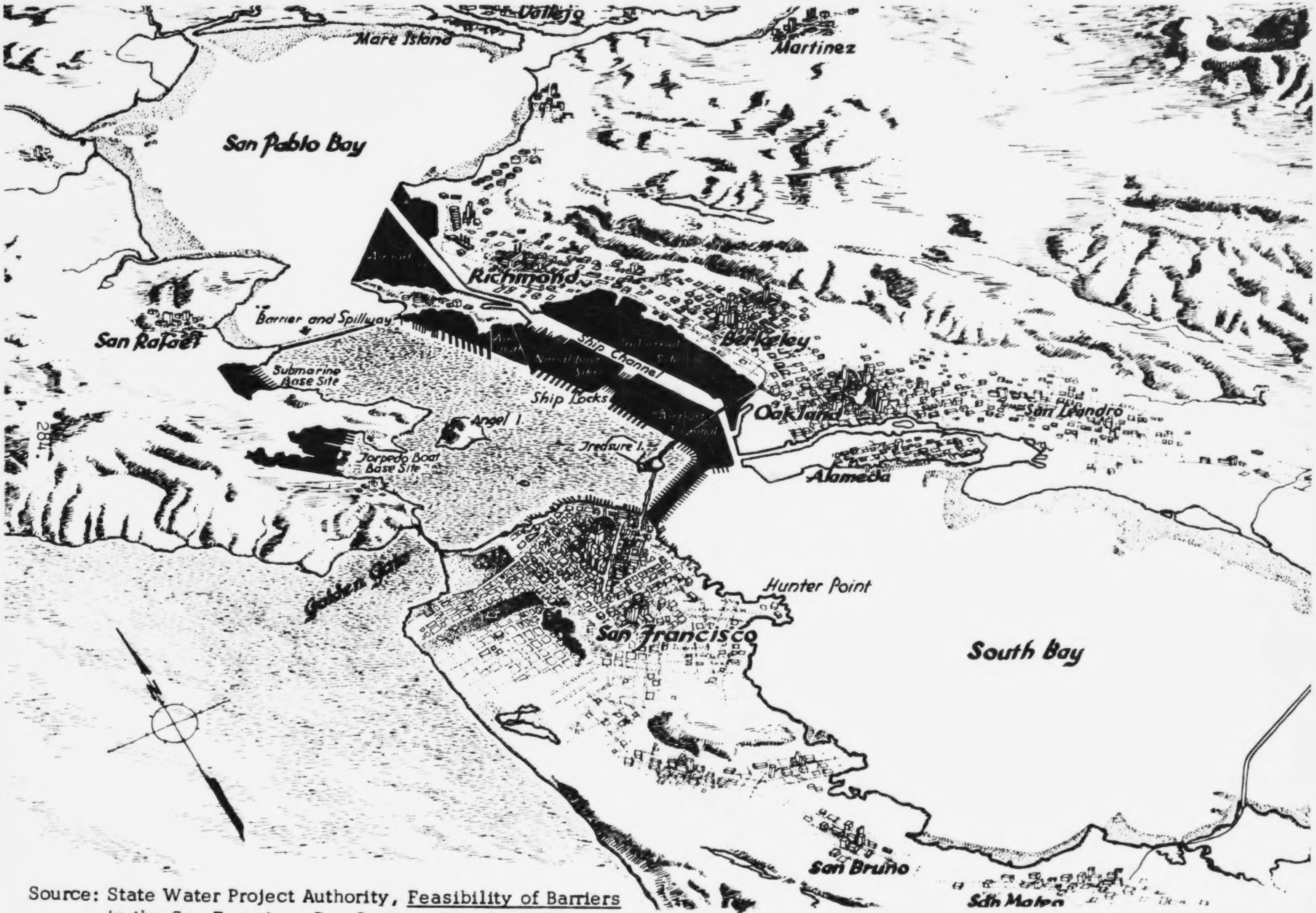
[510] Cal. Stats. 1953, Ch. 114, Section 1, in WPA, Report on Feasibility of Barriers (1955), Div. W.R., p. 13.

[511] WPA, Report on Feasibility of Barriers (1955), Board of Consultants, p. 5.

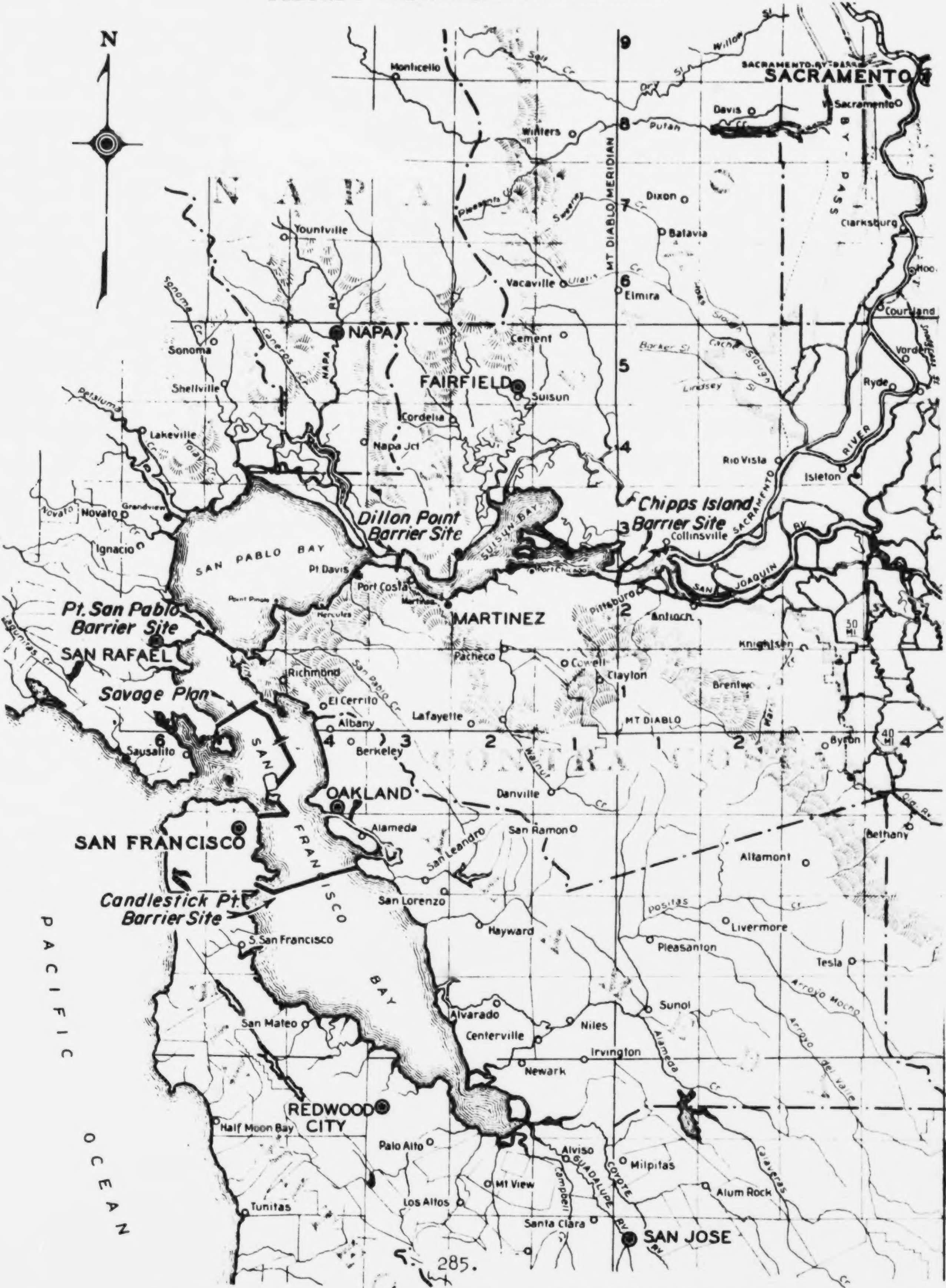
[512] Of the various plans, Weber's contained the most imagination. The gentleman spent 16 years in the State Assembly representing the Stockton area which his forefather founded. In a bid to switch to the upper house in 1949, he lost by 125 votes. Equipped with two degrees in engineering Weber financed his own project investigation at his estimated cost of $250,000. Weber Foundation Studies, An Approach to a California Public Works Plan, January 28, 1960, p. 14. Consisting more of imagination than sound engineering principals, Reber's plan did not receive serious consideration by the Division of Water Resources evaluators.


Vallejo
Mare Island
Martinez
San Pablo Bay
Richmond
Barrier and Spillway
San Rafael
Submarine Base Site
Ship Channel
Industrial Site
Naval Base Site
Berkeley
Ship Locks
Angel I.
Torpedo Boat Base Site
Treasure I.
Oakland
San Leandro
Alameda
Golden Gate
Hunter Point
San Francisco
South Bay
San Bruno
San Mateo

Source: State Water Project Authority, Feasibility of Barriers in the San Francisco Bay System, March, 1955.

FIGURE 8 REBER PLAN

FIGURE 9 ALTERNATIVE BARRIER SITES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NAPA
Monticello
Yountville
Sonoma
Shellville
Lakeville
Novato
Grandview
Ignacio
Petaluma
NAPA
FAIRFIELD
Suisun
Cordelia
Napa Jct
Winters
Davis
Dixon
Batavia
Vacaville
Elmira
Cement
Clarksburg
Courtland
Vorden
Ryde
Rio Vista
Isleton
SACRAMENTO
W Sacramento
SACRAMENTO BY-PASS
BY-PASS
MT DIABLO MERIDIAN
Putah
Ulatis Cr
Cache Slough
Barker Sl
Lindsey Sl
Chipps Island Barrier Site
Collinsville
SACRAMENTO
RIVER
SAN JOAQUIN
Dillon Point Barrier Site
SUISUN BAY
SAN PABLO BAY
Pt Davis
Point Pinole
Port Costa
Martinez
Hercules
MARTINEZ
Port Chicago
Pittsburg
Antioch
Knightsen
Brentwood
Byron
Pt. San Pablo Barrier Site
SAN RAFAEL
Savage Plan
Richmond
El Cerrito
Albany
Berkeley
Lafayette
Pacheco
Cowell
Clayton
MT DIABLO
CONTRA COSTA
Sausalito
SAN
FRANCISCO
BAY
OAKLAND
Alameda
SAN FRANCISCO
Danville
San Ramon
San Leandro
Candlestick Pt. Barrier Site
San Lorenzo
Hayward
S. San Francisco
Altamont
Bethany
Livermore
Pleasanton
Tesla
Positas
Arroyo Mocho
Arroyo del Valle
Alvarado
Centerville
Niles
Sunol
Irvington
Newark
Alameda Cr
San Mateo
REDWOOD CITY
Half Moon Bay
Palo Alto
Alviso
Milpitas
Mt View
Los Altos
Alum Rock
Calaveras
Guadalupe
Coyote
Campbell
Tunitas
Santa Clara
SAN JOSE
PACIFIC OCEAN
50 MI
40 MI
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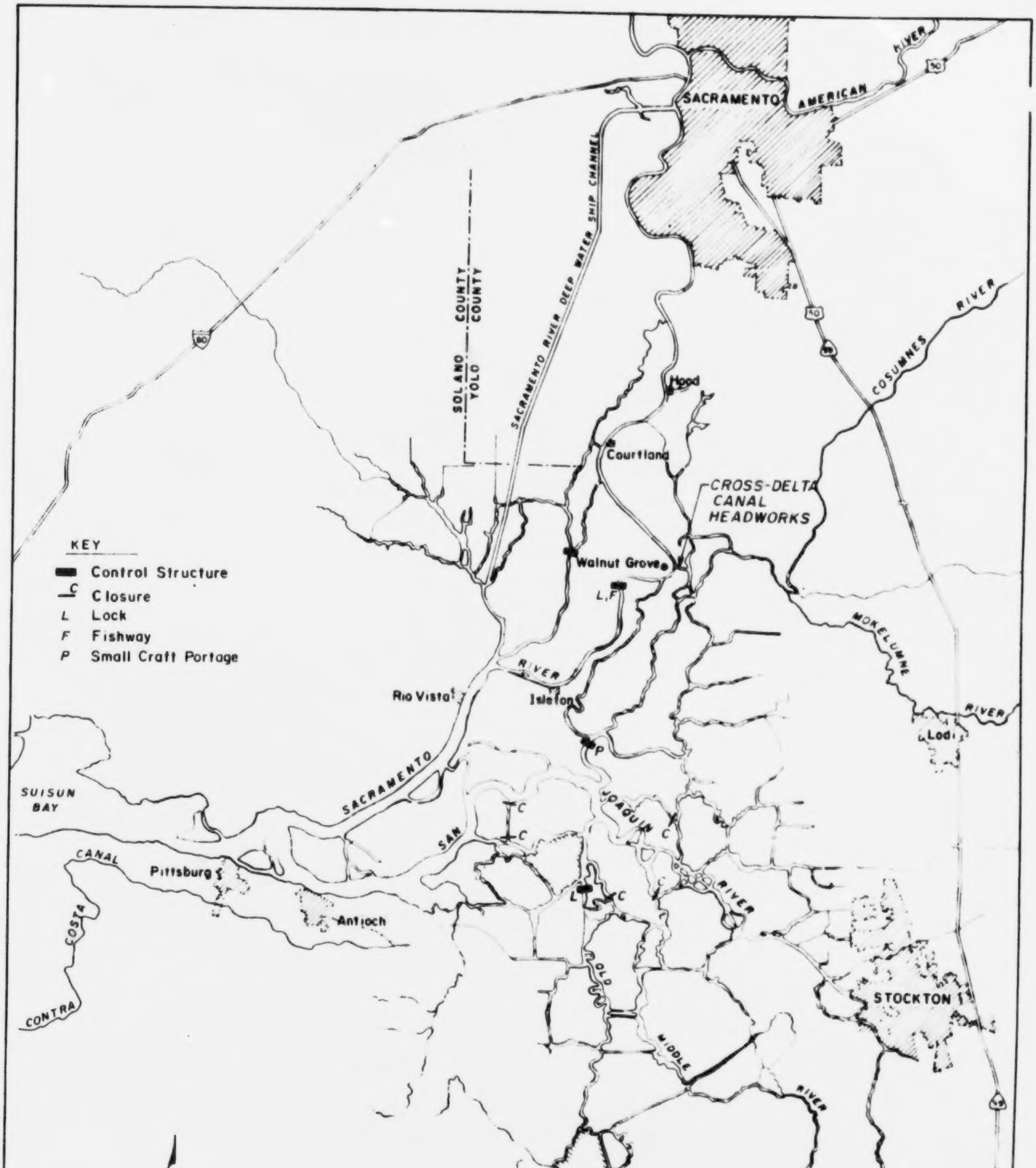
Source: State Water Project Authority, Feasibility of Barriers in the San Francisco Bay System, March, 1955.


SACRAMENTO
AMERICAN RIVER
50
SOLANO COUNTY
YOLO COUNTY
SACRAMENTO RIVER DEEP WATER SHIP CHANNEL
80
Hood
Courtland
CROSS-DELTA CANAL HEADWORKS
COSUMNES RIVER
KEY
Control Structure
C Closure
L Lock
F Fishway
P Small Craft Portage
Walnut Grove
L,F
MOKELUMNE RIVER
RIVER
Rio Vista
Isleton
P
Lodi
SUISUN BAY
SACRAMENTO
SAN JOAQUIN RIVER
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CANAL
Pittsburg
Antioch
L
C
CONTRA COSTA
OLD
STOCKTON
MIDDLE RIVER
99
N
STATE'S DELTA PUMPING PLANT
TRACY PUMPING PLANT
RIVER
CONTRA COSTA COUNTY
ALAMEDA COUNTY
CALIFORNIA
DELTA-MENDOTA CANAL
AQUEDUCT
Tracy
SCALE IN MILES
0 2 4 6 8
Livermore

FIGURE 10. BIEMOND PLAN

reclamation. The illustrations are self-explanatory, but a few words of contrast and comparison are in order.

In regard to navigation, the barriers varied in their potential impacts. The Biemond Plan which is described later would have minimum impact, as it was located further inland and it would have been equipped with only one set of locks. All others, save the Candlestick Point Barrier (South Bay), would have required four locks each.

Concerning Bay crossings, only the South Bay and Chipps Island sites received a positive rating. Authorization of the Richmond-San Rafael Bridge by the Toll Bridge Authority negated the potential benefit of a barrier at this site. Barriers in the South Bay could incorporate a crossing as could a Chipps Island proposal. The Chipps Island site, however, is in the western Delta, and the need for an additional crossing at this site was questionable. The Biemond Plan would not provide any surface transportation benefits.[513]

Environmentally, all barrier proposals would have negative impacts. The Reber and Savage plans would reduce the marine fishery resource by about 60 per cent, including a 100 per cent reduction of shrimp. Anadromous fisheries would be reduced over 90 per cent. The negative impact would be reduced with distance from the Golden Gate. The Biemond Plan would reduce the anadromous fisheries by 30 per cent.[514]

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[513] WPA, Report on Feasibility of Barriers, Div. W.R., pp. 34-36.

[514] Ibid., p. 51.

Degradation of Bay water quality surfaced as the major negative impact of all barriers downstream from Chipps Island. Evaporation would drive off fresh water and a substantial amount of the water supply behind the barriers would consist of municipal and industrial wastewater which at that time received only primary level treatment or no treatment. The following quote from the Board of Consultants points out that even with collection and exportation of the wastewaters with interceptors and a high level of treatment for those still discharging to the pools, aesthetic and biological problems would persist. Their evaluation follows:

> Unless extensive sewage and waste disposal works are provided, the water conserved in any barrier pool would become so polluted as to make it intolerable for adjacent residential development, for recreational use, and for support of fish and wildlife and unacceptable for agricultural or domestic use. Even with provision of intercepting sewers...and high order treatment for all sewage and other wastes not so intercepted the barrier pool waters would still be of doubtful quality. ...algae growths...intolerable conditions of odor and appearance. ...On the other hand, water conserved by the Biemond Plan would be usable for all purposes at all times.[515]

In this first round of evaluation, the Division of Water Resources recommended that "...further consideration be given only to...barriers...at or upstream from the Chipps Island site at the outlet of the Delta."[516] The Board of Consultants recommended the adoption of the Biemond Plan.[517]

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[515] Ibid., p. 31.

[516] WPA, Report on Feasibility of Barriers, Div. W.R., p. 91.

[517] WPA, Report on Feasibility of Barriers, Board of Consultants, p. 34.

Chipps Island and Biemond Plans

Since these two plans emerged as the most viable alternatives, it is appropriate to discuss their physical aspects. This will assist the reader in the evaluation of the early investigations and point out the inherent problems associated with barriers. The recognition of these problems is significant as barriers are still considered in the evaluation of all the alternatives for Delta transfers and Delta water quality maintenance.[518]

Chipps Island is located just west of and across the river from Pittsburg. The Sacramento River is approximately 4,000 feet wide at this narrow area, with a maximum depth of 56 feet. The barrier would be equipped with four sets of locks--two ship, one barge, and one small craft. The locks would be located adjacent to Chipps Island and a fishway would parallel the locks on the channel side. The fishway would incorporate a radial gate for closure during certain high tides to prevent the flow of saline water into the pool.[519]

The Biemond Plan departed from the other barrier schemes in several respects. Two small barriers were proposed--one at Steamboat Slough (of the Sacramento River) and the other on the main channel of the Sacramento before the river is rejoined by Steamboat Slough. Both locations are very close to each other, and they are located a short distance upriver from Rio Vista.

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[518] For example the Biemond Plan called the Waterway Control Plan and the Physical Barrier Plan at Chipps Island are considered as alternatives to the Peripheral Canal in DWR, Draft E.I.R.: Peripheral Canal, August, 1974. pp. VIII-3 and VIII-13.

[519] WPA, Report on Feasibility Barriers, Div. W.R., plate 23.

Approximately two miles above the Sacramento River Barrier, fresh water would be diverted into a new cross channel, siphoned under the San Joaquin River and delivered to the pumps in the South Delta. None of this export water would mingle with other Delta water. The Sacramento, Mokelumne, and San Joaquin rivers would be channelized and equipped with long large levees on both banks. Waters from these rivers would be hydrologically isolated from waters in the sloughs; and without any salinity control releases from the Sacramento, saline bay waters would have migrated some distance up the San Joaquin as the summer outflows tapered off.[520]

Abshire-Kelley Salinity Control Barrier Act of 1955

Following the filing of the March, 1955, salinity control barrier report in which the Division of Water Resources recommended further consideration given only to the barriers at or upstream from Chipps Island the Legislature responded with the Abshire-Kelley Salinity Control Barrier Act of 1955 incorporating the Division's recommendations and appropriating $100,000 for the study of the Biemond Plan and the Chipps Island Barrier. The schemes were to be developed and evaluated for:

> ...delivery of fresh water to the San Francisco Bay area...providing urgently needed flood protection to agricultural lands in the Sacramento-San Joaquin Delta, conducting subsurface exploration work in the Delta and designing facilities appurtenant to the cross-delta aqueduct, obtaining

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[520] Ibid., p. 57.

> more complete information on the hydrology of the delta, and studying integration of the proposed project in the California Water Plan.[521]

The appropriation was augmented by $200,000 in the Budget Act of 1956 and a report (Bulletin No. 60) was filed by the newly created Department of Water Resources (DWR) in March, 1957.[522] DWR concluded and recommended (among others): (1) that salinity control barrier studies be limited to the Biemond Plan; and (2) the North Bay Aqueduct "...is economically justified and financially feasible, and the North Bay Counties are urgently in need of a supplemental water supply."[523]

Further refinements of the Plan embraced the concepts contained in the original Biemond Plan. A hydrologically isolated Cross-Delta Canal would divert water from the Sacramento River at Walnut Grove, utilize a portion of the Mokelumne and San Joaquin river channels to deliver 4,600 cfs to the CVP pumping plants and

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[521] DWR, Salinity Control Barrier Investigation, Bull. No. 60, March, 1957, p. 18. The Water Project Authority was authorized to conduct the study in July of 1955; but in the administrative reshuffle, the duties and authority of this authority plus the Division of Water Resources were inherited by the newly created Department of Water Resources in July, 1956.

[522] DWR, Bull. No. 60, p. 19.

[523] Ibid., p. 76. But in 18 years DWR has been unable to convince the North Bay counties that they are in urgent need of Feather River Water. A small interim state facility, not the planned North Bay Aqueduct, delivers from the BOR, Putah South Canal terminal to the Napa County Flood Control and Water Conservation District. A total of 3,647 acre-feet was delivered in 1972: DWR, The California State Water Project in 1973, Bull. No. 132-73, June 1973, p. 26. For a description of the interim and final facilities, see DWR, The California State Water Project in 1970, Bull. No. 132-70, June 1970, pp. 4-5.

11,000 cfs to the SWP pumping plants. Some water would be lost to seepage, evaporation, and irrigation diversions; a designed capacity of 20,000 cfs was planned. The headworks of the CVP Delta Cross Channel would be enlarged for the Cross-Delta Canal.[524]

Abshire-Kelley Salinity Control Barrier Act of 1957

Positive legislative reaction to DWR's Bulletin No. 60 can be found in the last Abshire-Kelley Salinity Control Barrier Act which was passed in 1957. The Act appropriated additional investigation funds and it permitted DWR to limit its salinity control studies to the Delta Water Control (Biemond) Plan.[525]

The resultant bulletin (Bull. No. 76) and its four appendices represent a monumental attempt at analyzing the Delta problems associated with water transfers and maintenance of Delta water quality.[526] The Single Purpose Delta Water Project, utilizing the Biemond concept, is recommended for adoption. The project would incorporate ten channel closures scattered through the Delta to direct the export flow through the Delta without degradation by saline Bay waters. A salinity concentration of 1,000 ppm chlorides would be maintained 7 miles upstream from Antioch on the San Joaquin River. This standard, "...could be accomplished by maintaining an outflow from the Delta of 1,000 second-feet."[527] Jersey and Sherman islands in the western Delta would be supplied with an overland substitute supply. These supplies would be diverted from the isolated channel which would contain between 20 and 80 ppm of chlorides.[528]

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[524] DWR, Bull. No. 60, pp. 29, 30.

[525] Cal. Stats. 1957, Ch. 2092 in DWR, Delta Water Facilities, Bull. No. 76, p. 5.

[526] DWR, Delta Water Facilities, Bull. No. 76, December, 1960. Appendix: Economic Aspects, December 1961. Appendix: Delta Water Requirements, February 1962. Appendix: Salinity Incursions and Water Resources, April 1962, Appendix: Recreation, August 1962.

Western Delta interests, the Sacramento and Stockton Port authorities, recreationists, and fishermen adamantly opposed the plan because of the channel closure features.[529] Moreover, the Corps and the Bureau were independently developing plans for flood control and water transfers. This recommended plan lived a short life. However it is important to realize this was the recommended facility when the voters approved the Burns-Porter Act in November, 1960, thereby authorizing the necessary bonds for the financing of the state water project.

Bay-Delta Municipal Water Supply Considerations

In the initial stages the major purported reason for a barrier was to furnish a municipal water supply for the San Francisco Bay

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[527] DWR, Delta Water Facilities, p. 34.

[528] Ibid., p. 34.

[529] California Legislature, Assembly, Assembly Interim Committee on Water to the California Legislature, "The Delta Pool," Assembly Interim Committee Reports, 1959-61, Vol. 2[illegible], No. 2, January 2, 1971, p. 11.

Area. Information presented elsewhere in this thesis points out that such a need probably did not exist;[530] however, it should be remembered the forecasted Bay Area municipal supply shortage provided the momentum for the barrier studies.

The quotation from the Abshire-Kelley Salinity Control Barrier Act of 1953 previously presented (see text accompanying N. 510, *Supra*) makes no reference to a service area outside the Bay Area. Moreover, the projected municipal water needs in the Bay Area were used to give the act emergency status as the following section testifies:

> This act is an urgency measure necessary for the immediate preservation of the public peace, health or safety within the meaning of Article IV of the Constitution and shall go into immediate effect. The facts constituting such necessity are:
>
> The areas adjacent to the San Francisco Bay urgently need an adequate supply of fresh water for domestic and industrial uses. It is essential to the public health, safety and welfare that a study of salinity control barriers as a means of securing such a supply of fresh water be undertaken without delay.[531]

In the first WPA, feasibility of barriers study the Division of Water Resources concluded, "Water could be supplied to North Bay lands from Sacramento River through a conveyance system... without construction of a barrier. A supply of water for the Livermore [East Bay] and Santa Clara [South Bay] valleys and adjacent areas could be obtained through the system proposed for the Feather River Project."[532]

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[530] See Ns. 223, 523, *Supra* and N. 542 *Infra.*

[531] Cal. Stats. 1953, Ch. 114 in WPA, *Report on Feasibility of Barriers* (1955), Div. W.R., p. 13.

One might question the necessity of associating the South and East Bay system with the Feather River Project. The Contra Costa Canal has been pumping from Rock Slough from the southwest corner of the Delta since 1940. There is no reason why these areas could not build their own facilities and buy CVP water from the Bureau. Thus, one may conclude a viable alternative to the Bay Area water supply problem existed at the time without any additional barrier studies. Moreover, DWR reasoned that the South Bay was part of the Feather River Project "...and therefore, need not be considered as a feature of a barrier plan."[533] If the North Bay Aqueduct did not need a barrier and the South Bay Aqueduct was not considered as part of the barrier plans, it becomes more than obvious that the barrier studies were continued for the purpose of studying alternative export schemes.

Nevertheless, the Legislature gave the Abshire-Kelley Salinity Control Barrier Act of 1955 urgency status identical to that of the 1953 act.[534] The Abshire-Kelley Salinity Control Barrier Act of 1957 (the last of the three Acts) did not receive emergency status but it authorized studies for the purpose of:

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[532] WPA, Report on Feasibility of Barriers (1955), Div. W.R., p. 90.

[533] DWR, Salinity Control Barrier Investigation, Bull. No. 60, p. 18.

[534] Cal. Stats. 1955, Ch. 2092 in DWR, Delta Water Facilities, Bull. No. 76, p. 5.

> ...developing complete plans of the means of accomplishing delivery of fresh water to the Counties of Solano, Sonoma, Napa and Marin, ...accomplish salinity control, improving the quality of water exported from the delta to the San Francisco Bay area, San Joaquin Valley, and southern portions of California, making the most beneficial use of the water resources of the State, and studying integration of the proposed project in the California Water Plan.[535]

Thus, the major emphasis on the need for the barrier shifted from a municipal water supply in the 1953 act to water exportation in the 1957 act. This writer does not question the need for the salinity control barrier studies. These projects were legitimate first cut alternatives to a problem and they were, in their time, worthy of evaluation. The point to be made is the stimulation for consideration of barriers was provided by expanding water requirements in the San Francisco Bay area. When it became obvious, the barriers would only be minor aids in providing this supply, the studies were continued for the purpose of protecting project water exported from the Delta.

Salvaging Shasta Reservoir Salinity Control Releases

Potentially, a barrier could serve two major functions. First, it could facilitate the transfer of water across the Delta without degradation and second, it could salvage water that would otherwise flow into the Bay. From the literature reviewed it appears DWR anticipated the recovery of the salinity control releases being made at Shasta Reservoir. In other words, DWR assumed the Bureau would continue salinity control releases in the face of the salinity control barriers. Such an assumption seems overly generous to this writer.

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[535] Ibid., p. 5.

State planners calculated in Bull. No. 60 (1957) that salinity control could be maintained with the Biemond plan with an outflow of 1200 cfs.[536] DWR estimated the then existing outflows at 3,800 cfs; 3,300 from the CVP and 500 from rising groundwater. "The Biemond Plan was designed to conserve a portion of the water now used to repel salinity from the Delta."[537] Since salinity control could be maintained with 1,200 cfs instead of 3,800 cfs, "...approximately 2,600 second-feet would become available for other uses."[538]

And:

> For investigational purposes, it was assumed that salinity control would become the responsibility of the barrier agency. It was further assumed that the present salinity control flows, 3,800 second-feet, would be available for salinity control and disposition by the barrier construction agency.[539]

There is no discussion of an inter-agency barrier construction organization and the report does not call for closer cooperation or coordination with the Bureau. The Bureau was not at this time conducting or participating in any barrier studies. One is left with the impression that the DWR considered itself the barrier construction agency and it further assumed that the Bureau would continue the releases, underwriting the Feather River Project, the Bureau's largest competitor in the Northern California water industry.

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[536] DWR, Salinity Control Barrier Investigation, Bull. No. 60, pp. 28, 34, 68.

[537] *Ibid.*, p. 34.

[538] *Ibid.*, p. 34.

[539] *Ibid.*, p. 34. Also, see text accompanying N. 465 *Supra*.

In light of these DWR assumptions, one can readily understand why C. H. Spencer, Bureau Regional Director, disclaimed any obligation to the maintenance of salinity control in the Delta except for that necessary to protect the quality of export water. He stated, "I consider that the obligations of the Central Valley Project are satisfied when a satisfactory quality of water is provided at the intake to the Contra Costa and Tracy Pumping Plant."[540] As presented in the Salinity Control Policy Formation section of Chapter IV, this statement departs significantly from the historical commitments made by Regional Director Spencer and his predecessors.

PERIPHERAL CANAL

While the literature reviewed does not emphasize the existence of a competitive atmosphere between DWR and BOR officials over the development and exportation of Northern California water, there can be little doubt one existed. BOR officials must have resented attempts by state officials to buy or take over the CVP; and long before the Feather River Project was proposed, the Bureau had conducted preliminary geological surveys of the Oroville Reservoir area. Two small reservoir sites, now inundated by the Oroville facility, appear in the old BOR-CVP documents.[541] Competition also developed in the service areas; both projects wooed San Jose and Santa Clara County for water deliveries.[542] With the passage of the Burns-Porter Act in 1960, however, it became obvious that there would be two projects and cooperation would be mutually advantageous--if not necessary. In 1960 the Bureau and DWR negotiated an agreement for a coordinated operation of projects;[543]

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[540] See discussion accompanying N. 301 Supra and Appendix C.

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[541] See BOR, "Central Valley Basin California: Water Resources Development," 1:1,000,000 January, 1945, in Sen. Doc. 113, August, 1949, p. 61.

[542] Santa Clara Valley could have, 1) expanded its contract with San Francisco to receive additional water via the Hetch-Hetchy Aqueduct, 2) signed with the Bureau for deliveries from the proposed Pacheco Pass Aqueduct branching from San Luis Reservoir, or 3) taken deliveries from DWR's South Bay Aqueduct. They chose the last. Cooper, Aqueduct Empire, pp. 209-211.

[543] BOR and DWR, "Agreement Between the United States of America and the Department of Water Resources of the State of California for the Coordinated Operation of the Federal Central Valley Project and the State Feather River and Delta Diversion Projects," May, 1960. See also BOR and DWR, "Supplemental Agreement Between the United States of America and the State of California for Coordinated Operation of the Central Valley Project and the State Water Project," Draft, June 12, 1969. Revised December, 1970, January, 1971, and May 13, 1971. Because the CVP has more storage and less stringent commitments for deliveries, the agreements are regarded as favorable for the SWP. Both projects operate under the agreements, though a true implementation will not occur until a series of dry years or some other outside factor causes a shortage. The Secretary of the Interior has failed to approve the agreements as the CVP would in fact underwrite the SWP, should a

and an ad hoc Interagency Delta Committee, consisting of the Bureau, DWR, and Corps of Engineers, was formed in 1961 to develop and implement a coordinated Delta Plan. After four years of study, the Committee Recommended the Peripheral Canal.[544] Soon thereafter, the Committee dissolved; it remained for DWR and the Bureau to implement the project. Fig. 11 illustrates the location of the facility.

Need for the Canal

To understand the project operators' solid support for the canal, it is necessary to examine the interrelationships of export water quality and quantity, outflows and Delta hydrology. Table XVI illustrates the anticipated buildup of export water for each of the two projects and Table XVII presents the export water quality objectives.[545]

Some of the export water is diverted from the Sacramento River at Walnut Grove through a Cross-Delta Canal in the eastern Delta to the export pumps on the southern periphery. Water wheeled

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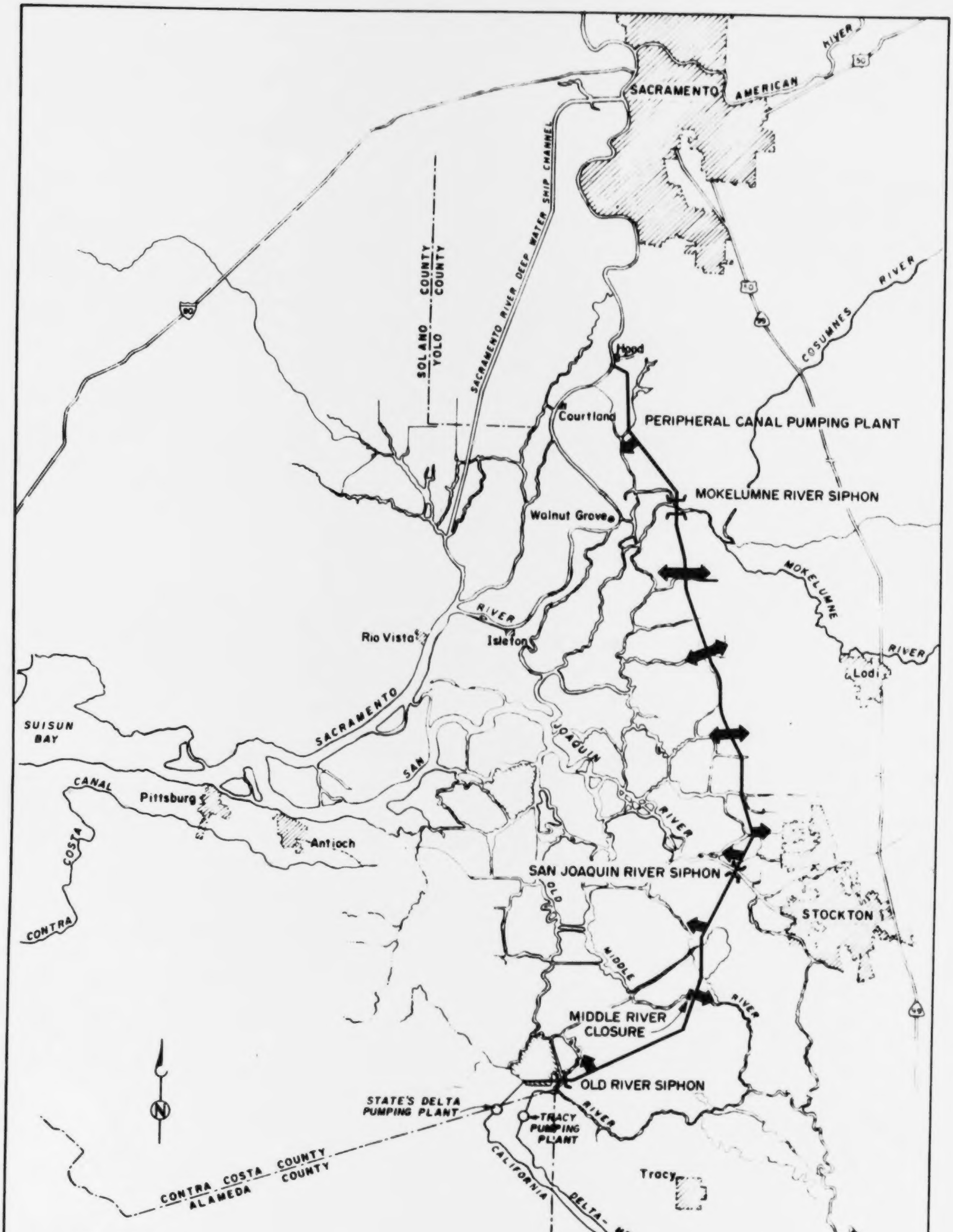
critical period occur. Also, the Environmental Defence Fund, Inc. has brought suit against the implementation of the agreement on the grounds it has not been accompanied by an Environmental Impact Statement. The case, Environmental Defence Fund, Inc. v. Morton, is inactive as the BOR has agreed to prepare an EIS. DWR, Bull. No. 132-74, p. 9.

[544] Interagency Delta Committee, Plan of Development: Sacramento-San Joaquin Delta, January, 1965. DWR states the Bureau advanced the Peripheral Canal concept at hearings on Bull. No. 76, in April, 1963; DWR, The California State Water Project in 1964, Bull. No. 132-64, June, 1964, p. 61.

[545] The reader should not confuse the export water objectives with the water quality standards set by the state Water Resources Control Board. Objectives and standards are distinctly different. See discussion on p. 327 Infra.


SACRAMENTO
AMERICAN RIVER
50
80
SOLANO COUNTY
YOLO COUNTY
SACRAMENTO RIVER DEEP WATER SHIP CHANNEL
COSUMNES RIVER
Hood
Courtland
PERIPHERAL CANAL PUMPING PLANT
MOKELUMNE RIVER SIPHON
Walnut Grove
MOKELUMNE RIVER
Rio Vista
RIVER
Isleton
Lodi
SUISUN BAY
SACRAMENTO
SAN JOAQUIN RIVER
CANAL
Pittsburg
CONTRA COSTA
Antioch
SAN JOAQUIN RIVER SIPHON
OLD
STOCKTON
MIDDLE
MIDDLE RIVER CLOSURE
RIVER
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STATE'S DELTA PUMPING PLANT
TRACY PUMPING PLANT
RIVER
N
CONTRA COSTA COUNTY
ALAMEDA COUNTY
CALIFORNIA DELTA-MENDOTA AQUEDUCT CANAL
Tracy
SCALE IN MILES
0 2 4 6 8
Livermore

FIGURE 11. PERIPHERAL CANAL

TABLE XVI

ESTIMATED BUILDUP IN ANNUAL AMOUNTS OF WATER TO BE CONVEYED ACROSS THE DELTA FOR DELIVERY BY SWP AND CVP TO AREAS SOUTH AND WEST OF THE DELTA (IN ACRE-FEET)

Year	SWP	CVP	Total
1973	1,261,100	2,219,600	3,480,000
1980	2,180,300	3,449,000	5,629,300
1990	3,579,300	3,742,000	7,321,300
2000	3,921,000	3,842,000	7,754,100
2010	4,133,400	3,953,000	8,086,400
2020	4,406,000	4,087,000	8,493,000

Source: DWR, Draft EIR: Peripheral Canal, p. II-30.

TABLE XVII

WATER QUALITY OBJECTIVES FOR WATER EXPORTED FROM THE DELTA BY THE STATE WATER PROJECT AND CENTRAL VALLEY PROJECT

Project	Constituent in Parts per Million (ppm)		
	TDS	Chlorides	Hardness
State Water Project			
Monthly average	440	110	180
10-year average	220	55	110
Central Valley Project			
Delta-Mendota Canal			
Daily average	800	-	-
Monthly average	600	-	-
Yearly average	450	-	-
5-year average	400	-	-
Contra Costa Canal			
65 percent of year	380	100	-
35 percent of year	750	250	-

Source: DWR, Draft EIR: Peripheral Canal, p. II-31.

through the improved and straightened sloughs making up the Canal mixes with the poorer quality agricultural return flows of the San Joaquin River. When the pumping rates reach 4,000 cfs, the hydraulic capacity of the Cross-Delta Canal is exceeded and the balance of the export water flows down the Sacramento River, around the western tip of Sherman Island, and back up the San Joaquin River to the export pumps.[546] Table XVIII presents the present monthly mean pumping rates. Not only must the projects presently maintain large outflows to protect the export water as it rounds Sherman Island, with future large exports planned, "...there is a risk that either water quality criteria or quantity requirements in the Project service areas could not be met."[547]

As discussed in the next chapter, the projects have for some time been committed to a Delta water quality level in August that can be maintained with a Delta outflow of about 1800 cfs.[548] This 1800 cfs figure may be conservatively low, but there is little doubt the present August outflow exceeds that necessary to maintain water quality for in-Delta water use. Table XIX presents the recent and present Delta outflow; the high summer outflows are maintained to

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[546] DWR, Department of Fish and Game, Delta Fish and Wildlife Protection Study: Dissolved Oxygen Dynamics: Sacramento-San Joaquin Delta and Suisun Bay, October, 1972, p. 27.

[547] DWR, Draft Environmental Impact Report: Peripheral Canal Project, August, 1974, p. II-32. Notice this quote relates to criteria, not objectives. See N. 545 Supra.

[548] See discussion accompanying Ns. 595 - 597, Infra. and N. 301, Supra.

TABLE XVIII
DELTA EXPORT PUMPING RATES

	1972			1973			1974			1975 (Projected)		
	Range	Total		Range	Total		Range	Total		Range	Total	
	cfs/day	cfs	AF	cfs/day	cfs	AF	cfs/day	cfs	AF	cfs/day	cfs	AF
Jan	210-3,080	50,692	100,550	1,137-6,263	89,109	176,750			186,766[a]	n.g.	n.g.	283,000
Feb	2,663-6,587	109,316	216,830	68-2,571	32,956	65,370	3,369-8,902	154,648	306,750			396,000
Mar	5,108-10,570	204,615	405,850	494-3,063	41,243	81,800	4,488-9,872	192,218	381,260			455,000
Apr	3,997-10,402	189,411	375,140	998-6,529	100,272	198,350	2,839-6,800	124,744	247,430			420,000
May	5,204-8,055	195,457	387,690	5,070-9,610	196,863	390,480	5,425-10,919	219,189	434,760			424,000
Jun	1,411-8,171	155,438	308,310[b]	6,310-7,996	218,931	434,250	6,433-11,037	269,801	535,180			523,000
Jul	3,057-6,833	154,781	307,010[b]	6,599-11,188	234,236	464,600	9,612-11,053	327,735	650,060			559,000
Aug	5,720-9,390	210,877	418,270	6,536-11,172	236,795	469,680	6,186-11,358	288,938	573,100			533,000
Sep	5,174-10,171	208,600	413,770	4,336-9,783	170,991	339,160	4,114-9,284	148,978	295,500			466,000
Oct	1,378-10,078	198,120	393,620	4,115-10,165	182,977	363,550	1,972-5,561	140,947	279,840			445,000
Nov	1,947-6,013	106,748	211,740	3,358-6,376	145,669	288,930	810-4,545	58,091	115,220			449,000
Dec	2,409-4,546	107,151	212,540	2,551-7,372	158,934	315,240	1,611-5,238	88,240	175,030			380,000
Annual Total			3,751,320			3,588,160			4,180,896			5,334,000

[a] Actual data not found; value represents average of the months of January for other three years.

[b] Pumping in June and July was greatly reduced due to the Andrus Islands Flood (see discussion between Ns. 104-107) DWR went from 1,757 cfs to 225 while BOR reduced from 4,233 to 925 at Tracy (Delta-Mendota) and from 236 cfs to 225 cfs at Rock Slough (Contra Costa Canal) DWR stopped pumping 5 days in July while the Bureau's Tracy and Rock Slough Plants remained steady.

Source: Information for 1972, 1973 and 1974 was taken from 35 monthly reports issued by BOR, Central Valley Operations Office, Water and Power Control Division, Report of Operations, January, 1972 - December, 1974.
1975 Projected data from Table 7 of December, 1974, Report of Operations.

TABLE XIX
COMPUTED DELTA OUTFLOWS
(Mean montly flow in 1,000 cubic feet per second)

Month	Avg. 1960-71	1965	1966	1967	1968	1969	1970	1971	1972[b]	1973[b]	1974[b]
Jan	39.0	85.7	39.7	37.7	22.2	62.4	80.4	54.9	22.2	60.7	83.8
Feb	49.9	52.2	30.6	58.0	41.2	97.9	72.9	32.9	21.5	71.9	51.4
Mar	35.5	26.8	23.9	46.3	36.1	76.2	48.6	27.0	19.5	58.1	63.1
Apr	31.8	48.5	18.6	60.8	8.8	63.9	10.1	34.2	7.0	20.9	67.1
May	25.2	30.5	9.7	67.6	6.3	59.5	9.8	23.9	5.6	11.1	23.1
Jun	15.9	14.4	3.0	58.2	3.7	45.1	4.8	21.0	6.2	7.1	15.7
Jul	6.4	5.5	3.2	24.2	3.2	12.4	4.1	11.5	6.6	4.0	7.8
Aug	6.2	8.0	4.8	9.1	4.3	11.6	7.1	12.8	5.9	5.2	11.5
Sep	10.8	12.9	6.5	15.0	5.0	18.4	14.1	19.6	9.1	10.2	19.7
Oct	11.2	13.9	6.3	14.8	4.4	15.9	11.6	13.2	10.1	11.2	16.9
Nov	15.9	22.4	18.0	15.8	9.6	18.6	20.5	13.7	21.3	45.7	22.6
Dec	31.5	28.0	50.5	19.8	21.6	37.2	63.9	21.3	26	64.7	26.8

[a] Computed from a summation of flows of Sacramento River at Sacramento plus San Joaquin River near Vernalis, less diversions to Delta-Mendota and Contra Costa Canals, less diversions to California Aqueduct in 1968 and 1969, less inflows to Clifton Court Forebay beginning in 1970, less comsumptive use in Sacramento-San Joaquin Delta. From USBR-DWR Joint Study, April, 1969.

[b] From USBR, Central Valley Operations Office, Report of Operations, December, 1974; December, 1973.

protect the quality of the export water as it rounds Sherman Island. The quality of this water that rounds Sherman Island must exceed the project's objectives in Table XVII in order to dilute the poor quality agricultural return water in the San Joaquin River that is also pulled into the pumps.

Figure 12 graphically illustrates the relationship between the rate of Delta outflow and the rate of exports with the present system. The peak rate of exports is 14,950 cfs:10,000 SWP; 4,600 CVP - Delta Mendota; and 350 CVP Contra Costa Canal.[549] In order for the projects to export at this rate, they must maintain a positive outflow in excess of 6,000 cfs.[550] Should a critical dry year occur after 1980 DWR calculates there would not be sufficient storage water to maintain the high Delta outflow and meet the project's exports. According to DWR,

> The studies show that for 3 dry years of the 33-year hydrologic study period used [1921-22 through 1953-54], there is a risk that either water quality criteria or quantity requirements in the Project service areas could not be met if the Peripheral Canal is delayed beyond 1980. The chances of experiencing a dry year increases with each year of delay.[551]

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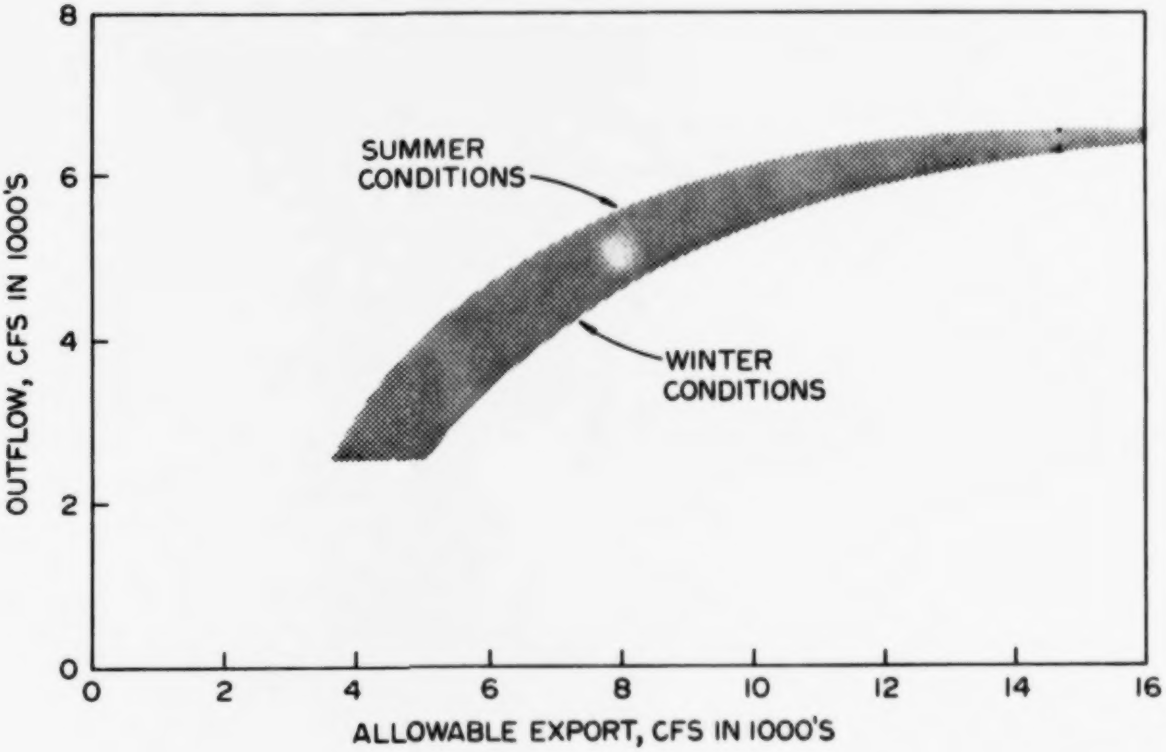
[549] DWR, Delta Water Facilities, Bull. No. 76, p. 66.

[550] The author is uncertain as to why some outflows (Table XIX) exceed the 6,000 cfs figure. Perhaps Figure 12 is wrong but such a possibility is doubtful. It could be that in the present low water demand years for the projects, the releases are for maximum reservoir power generation in the high-power demand summer. See DWR, Draft EIR: Peripheral Canal, p. 111-55.

[551] Ibid., p. 11-32.

FIGURE 12.

DELTA OUTFLOW PROJECT PUMPING RELATIONSHIP



With a year 2020 level of water development, Decision 1379 water quality standards (presented later), the present system of cross-Delta transfers, and a critical dry year, the projects will be short 3.2 MAF. By reducing the amount of storage water needed for Delta water quality control the Peripheral Canal would reduce this deficiency to 1.4 MAF. The critical dry year used in these calculations is the seven year average in the seven year critical dry period 1928-1934.[552]

In the next chapter questions are raised as to the hydrologic assumptions used in these calculations. Also this section closes with some personal observations of the writer's on the need for the facility. However the foregoing clearly indicates why the project operators need the peripheral canal. The canal would enable the operators to meet contractual quality requirements while at the same time conserving water to meet the quantity requirements. There is little doubt that the projects eventually will have to reduce projected deliveries, relax export water quality, relax Delta water quality, or some combination of the three unless the canal is constructed.

Before the description and authorization status of the Canal is discussed, two additional topics relative to need should be identified. As outlined below, the SWP needs the Peripheral Canal much more than the CVP and the SWP has somewhat created the need for the facility.

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[552] Ibid., p. V-153. See also, text accompanying N. 580 664 Infra.

It is generally recognized that the CVP has a surplus of water[553] while the State Water Project will not be able to meet its contractual requirements by 1990 should a dry year occur.[554] Under a previously cited agreement between DWR and BOR the two projects will share project water shortages should they occur.[555] However, considered independently, the SWP will need additional water for commitments in future years long before the CVP. Thus, the SWP needs the water that the Peripheral Canal would salvage much more than the CVP.

The SWP needs the project more than the CVP for another reason. The restrictive SWP Delta export water quality objectives

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[553] See discussion accompanying N. 697 *Infra*. This storage surplus has been identified as 2 MAF. DWR Director John Teerink, statement before the California Legislature. Senate Committee on Agriculture and Water Resources. *Hearings* on Statewide Water Supply and Demand. January 14, 1975.

[554] DWR approached the supply-demand consideration by commiting the project to deliveries beyond the present supply. The Burns-Porter Act authorizing the $1.75 billion of general obligation bonds for the SWP, set aside part of these funds for future storage projects. Lyle W. Martin, President, Association of California Water Agencies. Statement before the California Legislature. Senate Committee on Agriculture and Water Resources. January 14, 1975. Should the 1928-34 historic critical dry period recur (See text above Ns. 664, 665 *Supra*) after 1990, the project will be short over 900,000 acre feet. Very little additional water will be required in other water years. Lowell D. Wood, "Evaluation Procedures of the U.S. Army Corps of Engineers: The Dos Rios Project" in *California Water* David Seckler editor, pp. 277, 282. The 900,000 figure was identified in 1966 and it does not take into account the additional supplies that may be required for D1379 outflows. The recurrence frequency of the critical dry period is qualified in the final chapter.

[555] See N. 543 *Supra.*

(see Table XVII) place the SWP in a much more vulnerable position in the Delta without the Peripheral Canal than the CVP. With increasing larger exports, these high SWP Delta export objectives will be increasingly difficult to maintain. Thus, at some time in the future without the canal, the state will either have to turn off its pumps because the objectives will be exceeded or pump water inferior to its contractual commitments. CVP exports will not be affected as their Delta export water quality objectives are not as restrictive as those of the SWP.

The SWP has created or hastened the need for the Canal in two ways; by increasing Delta exports, and by contracting a high quality water. Before the SWP came on line, the CVP was able to meet its export quality requirements with much less Delta outflow. The major portion of the CVP export water crossed the Delta through the Cross-Delta Canal and the small amount that swung around Sherman Island and up the San Joaquin River could be protected by relatively small outflows. These San Joaquin River reverse flows made up a small percent of the export supply, thus they could suffer some degradation due to the dilution afforded by the Cross-Delta flows. Also, the Delta water quality objectives for the CVP are much lower than those for the SWP and therefore much easier to maintain.[556]

By increasing the Delta exports from about 5,000 cfs with the

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[556] However, the Bureau does export from a more western location at Rock Slough for the Contra Costa Canal. This water has a restrictive Cl^- requirement (N. 288 Supra) but the small volume pumped probably does not require a great deal of protective outflow.

CVP pumping alone to approximately 15,000 cfs, the SWP places more stress on the Delta hydraulic system with large San Joaquin River reverse flows. These reverse flows act to pull in saline bay waters on incoming tides and this influence must be compensated for by large positive Delta outflows. In addition, DWR committed the SWP to Delta water quality objectives much higher than those of the CVP. Thus, the outflows must be increased even more to protect the high quality SWP water. Since the projects share the responsibility for the Delta outflows, the CVP is underwriting the SWP Delta exportation. If the canal is not built and circumstances, described above, develop to the point the state would have to stop its Delta pumping because its water quality objectives cannot be met, the CVP could continue to pump because of its lower objectives. The writer does not wish to imply the Bureau does not want the project; such is not the case. The above discussion is presented to underline the statement, the SWP needs the project much more than the CVP.

Facility Description

The Peripheral Canal concept is not new. It was studied by the Bureau in 1943, Weber in 1960, and DWR in 1956.[557] Other alternatives, such as the Cross-Delta Canal, seemed more cost-effective at the time.

As envisioned, the 43-mile long canal would divert water from the Sacramento River at Hood and transport it around the Delta's eastern periphery to the pumps on the south side. See Fig. 13. The unlined canal will resemble a slow moving river 400 feet wide and 30 feet deep. It will be equipped with four inverted siphons diving under the Mokelumne River, Disappointment Slough, San Joaquin River, and Old River. Diversion capacity will be 23,300 cfs and the canal narrows with a delivery capacity of 16,800 cfs.[558]

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[557] Lawrence Christy Spencer, "The Sacramento San Joaquin Delta--A Water Quality Riddle" (unpublished Master's thesis, California State University, Sacramento, 1972), p. 80. Mr. Spencer is a senior water rights engineer with the State Water Resources Control Board.

The facility is to be integrated with three other projects. Flood flows from the Morrison Creek Flood Control Project in Sacramento County will be accepted into the Canal;[559] eight million cubic yards of excavation was used in the construction of Interstate Highway 5 in San Joaquin County;[560] a BOR Hood-Clay Pump Connection, as planned, would ultimately divert 4 MAF from the first reach of the Canal up to the BOR planned East Side Canal which, if authorized, would deliver water from the terminus of the Folsom-South Canal to Bakersfield.[561] Twelve turnouts along the Canal will allow for water quality diversions into the Delta, thereby re-establishing an east-to-west flow. With the present system, the pumps create a reverse flow in the San Joaquin River, drawing in several million fish eggs and fry from the spawning and rearing areas in the Delta. After a thoroughly

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[558] DWR, Draft EIR: Peripheral Canal, p. 111-9.

[559] DWR, The Delta and the State Water Project, unnumbered Memorandum Report, June, 1969, p. 24.

[560] DWR, Bull. No. 132-72, p. 5, and Bull. No. 132-68, pp. 34, 35.

[561] BOR, Peripheral Canal Feasibility Report, p. 58. See N. 252 Supra. for a discussion of the status of the East Side Canal.

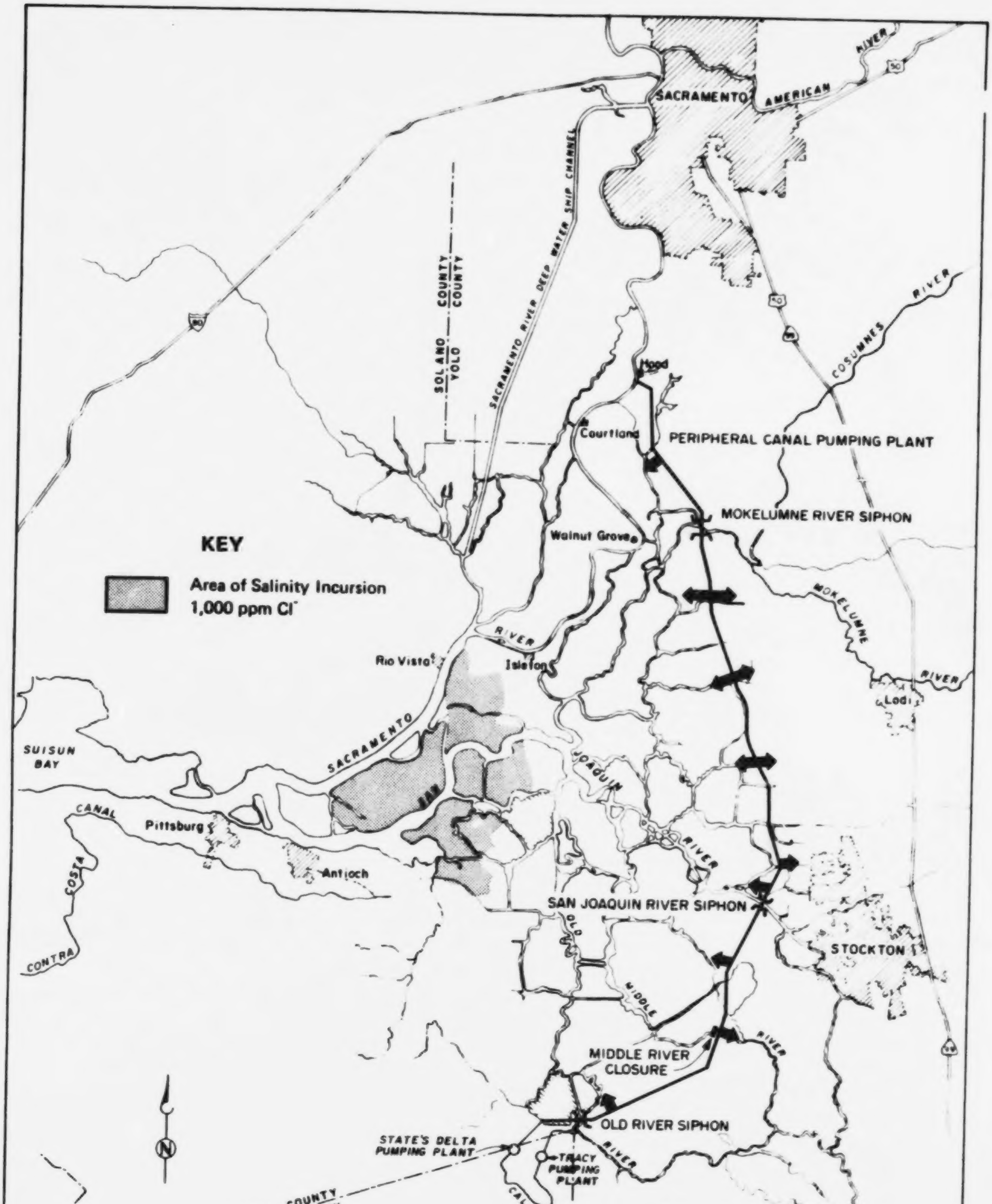
SACRAMENTO
AMERICAN RIVER
50
SOLANO COUNTY
YOLO COUNTY
SACRAMENTO RIVER DEEP WATER SHIP CHANNEL
80
COSUMNES RIVER
Hood
Courtland
PERIPHERAL CANAL PUMPING PLANT
MOKELUMNE RIVER SIPHON
Walnut Grove
KEY
Area of Salinity Incursion
1,000 ppm Cl$^-$
MOKELUMNE RIVER
Rio Vista
RIVER
Isleton
Lodi
SUISUN BAY
SACRAMENTO
SAN JOAQUIN RIVER
CANAL
Pittsburg
Antioch
COSTA
CONTRA
SAN JOAQUIN RIVER SIPHON
STOCKTON
OLD
MIDDLE
RIVER
MIDDLE RIVER CLOSURE
OLD RIVER SIPHON
STATE'S DELTA PUMPING PLANT
TRACY PUMPING PLANT
RIVER
N
CONTRA COSTA COUNTY
ALAMEDA COUNTY
CALIFORNIA
DELTA-MENDOTA
AQUEDUCT
CANAL
Tracy
SCALE IN MILES
0 2 4 6 8
Livermore

FIGURE 13. SALINITY INCURSION WITH NOVEMBER 19, 1965 CRITERIA AND PERIPHERAL CANAL

extensive examination of water quality conditions in San Francisco Bay and the Delta, Kaiser engineers stated, "...The Peripheral Canal, properly designed and operated, can be a decided asset to the control of water quality..."[562]

It is not implied here that the Canal will solve the complex ecological problems in the Delta. Since the Canal would reduce outflows and turbidity, optimum light conditions for Neomysis, the primary food of striped bass, may be reduced. The reduced flows may also reduce the supply of nutrients in the ologihaline zone (upper end of the transition between fresh and salt water) and thus the dependent biotic components.

Recognizing the technical support for the canal as presented above and the continuing support by the California Department of Game,[563] the writer feels, the key to the present Peripheral Canal controversy is not whether it should be built, but how much water should be released to maintain Delta water quality! This topic is discussed in the subsequent Delta water quality chapter.

Authorization Status

While the Bureau has not received Congressional authorization for its "half" of the Peripheral Canal, DWR has received authorization in the broadly worded 1951 authorization of the Feather River Project and Sacramento-San Joaquin Delta Diversion Project.[564] On March 16, 1966, the DWR Director, by way of a Project Order, "...officially designated the Peripheral Canal as the State Water Project facility to transfer water across the Sacramento-San Joaquin Delta."[565]

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[562] State Water Resources Control Board San Francisco Bay-Delta Water Quality Control Program prepared by Kaiser Engineers, March, 1969, p. XVIII-12.

[563] California Department of Fish and Game, Ecological Studies of the Sacramento-San Joaquin Estuary, June, 1972, p. 78.

The implementation of the Canal then depended on Congressional authorization for Bureau participation. An environmental impact statement or report was not required at this time as it was prior to the passage of the National Environmental Policy Act (1969) or the California Environmental Quality Act (1970).

While the lead agency for design, construction and operation was not early established, DWR assumed leadership by initiating right-of-way studies in February of 1966. An Interagency Work Group "...was established to assure that the work done by the Department will be acceptable to the Bureau, in the event the latter acts as the design and construction agency."[566] As will be pointed out, DWR has maintained the greatest momentum in bringing the project to fruition; although it has been a joint technical effort from the beginning.

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[564] California Water Code, Sec. 11260. See quote in text accompanying N. 418 Supra.

[565] DWR, Bull. No. 132-66, p. 21.

[566] Ibid., p. 22.

The usual path for Congressional authorization of a project is for the Bureau to prepare a favorable feasibility report of the project and circulate it to all federal and state agencies. The report is then transmitted to the Commissioner of the Bureau who, in turn, passes it along to the Secretary of the Interior with comments. The Secretary will have his staff analyze the report, ask the Bureau for changes if necessary, and submit it to Congress. Congress may then authorize it and usually at some later time provide funding. Such has not been the case with this project, probably because of the controversy over Delta water quality.

Prior to the issuance by the Bureau of a Feasibility Report in 1968, DWR Director Gianelli briefed the California Congressional Delegation in Washington, Sacramento, and Los Angeles in 1966 on the urgency of federal authorization.[567] A bill authorizing Bureau participation was introduced in the House in the same year. No action was taken on the bill.[568]

In 1967, DWR announced it would defer design work on the project to allow additional time to obtain federal authorization of the joint project.[569] H.R. 10297 was introduced in the first session of the next congress (Kuchel and Murphy, 1968) to be followed by S. 3312 in the second session. Both bills were designed to authorize

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[567] DWR, Bull. No. 132-67, p. 19.

[568] *Ibid.*, p. 19.

[569] DWR, Bull. No. 132-68, p. 35.

Bureau participation in the canal; both failed.[570]

The imbroglio over Delta water quality standards that had developed by the late sixties probably hampered favorable action by Congress. The Secretary of the Interior has approved the Bureau's Peripheral Canal Feasibility Report, but he has not submitted the document to Congress. Under the National Environmental Policy Act, the Secretary must also prepare an Environmental Impact Statement on the project and submit both documents to the Congress at the same time. At the time of this writing (April, 1975) the Bureau had prepared a proposed draft EIS which was submitted to the Secretary of the Interior.[571] The statement has not been circulated for public review.

Governor Reagan, plus the Senate Committee on Water Resources and the Assembly Water Committee, voiced strong support for the project in 1970, but the latest effort by Washington law makers has produced negative results.[572] An omnibus $1.6 billion California water development bill was introduced in the House by Sisk and Mathias in 1972. Containing both the CVP East Side Canal and the Peripheral Canal Project, Sisk admitted, "...there was no chance of passage of the measure by this Congress."[573] Three months later, DWR Director Gianelli told the Assembly Committee on Water that DWR would build the project alone.[574]

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[570] Ibid., p. 35

[571] DWR, Bull. No. 132-70 and DWR, Bull. No. 132-73, p. 5. Billy Martin, Regional Director, BOR. Statement before the California Senate. Committee on Natural Resources and Wildlife. Hearings on the DWR, Draft EIR: Peripheral Canal, December 11, 1974.

[572] DWR, Bull. No. 132-70, pp. 5, 6.

DWR submitted its Draft Environmental Impact Report on the Peripheral Canal in August, 1974. A beginning construction date of 1975 is contemplated with water deliveries scheduled for 1980. Construction and operation schedules will proceed as if there were full CVP participation. DWR contemplates an agreement whereby DWR will charge the Bureau a utility rate for wheeling CVP water through the canal. Initially, Sacramento River water will be diverted by gravity. By 1985, additional diversion capacity will be added by the installation of diversion pumps.[575]

In the Peripheral Canal EIR, DWR does not indicate whether or not the Bureau can enter into a "wheeling agreement without Congressional approval. Regional Bureau Director Martin, however, indicates BOR participation will be conditional upon Congressional authorization.[576] Since this authorization has not been consummated, the certainty of the Bureau's participation or the modus operandi of future Delta exports are in doubt. The Governor's newly appointed DWR Director, Ron Robie, has stated the project is deferred for two years while it is undergoing intensive review.[577] Prior to this appointment, Robie served as a member of the State Water Resources Control Board for almost six years.[578] During this time the Board issued Decisions 1379, 1400 and 1422 which are discussed in the next chapter. The author's opinions on the status of the Peripheral Canal and the adequacy of the EIR are discussed in the concluding chapter.

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[573] Sisk points out that he put the Peripheral Canal and the East Side Project in the same bill for political reasons. The Metropolitan Water District of Southern California (MWD) purveys water to almost every municipality south of the Tehachapi Mts. and is a major customer of SWP water. However, the East Side Canal will not benefit this area and MWD opposes it. Thus, Sisk, from Fresno, sought to link the two together, but he stated, "...The Interior committee is sympathetic to the bill but will not act unless there is united support for it on the home front. In "Omnibus Bill Introduced to Authorize Peripheral Canal." The Sacramento Union, August 3, The Sacramento Bee, February 4, 1973, p. p-1.

[574] Gianelli, before the Assembly Committee on Water, November 9, 1972.

[575] DWR, Draft EIR: Peripheral Canal, p. 111-29.

On the matter of coordinated operation, the two agencies plus the state Department of Fish and Game and the U.S. Fish and Wildlife Service have signed a statement of intent to draft and sign a Peripheral Canal operating agreement prior to the construction of the project.[579] It seems quite possible to this writer that the water quality objectives in this agreement will resemble those contained in D1379 and they may be written into the Congressional authorization for the Bureau. Such an action would enhance the chances of congressional authorization and remove a great deal of controversy over BOR compliance with Delta water quality objectives and standards. The water quality controversy is presented in the next chapter; the final chapter contains discussions relating to future delta conditions.

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[576] Statement before the California Senate. Committee on Natural Resources and Wildlife. Hearings on the DWR, Draft EIR: Peripheral Canal, December 11, 1974.

[577] San Francisco Chronicle, March 5, 1975, p. A2. Ronald B. Robie, Director, Department of Water Resources,"Report of Activities of the Department of Water Resources" presented to the California Water Commission, April 4, 1975.

[578] See N. 613 Infra.

[579] Contra Costa Times, October 10, 1974, p. 1.

CHAPTER VIII

DELTA WATER QUALITY: A QUESTION OF OBJECTIVES, STANDARDS AND TRADEOFFS

> We must build and answer questions later... final answers to many of our most perplexing questions must be derived from the construction and operation of our first State Project...
>
> DWR Director, Harvey O. Banks, 1956
> N. 433, Supra.

> The project cannot live with criteria more restrictive than those of the November 19, 1965, agreement... the adoption of more restrictive criteria could... possibly destroy the financial integrity of the entire State Water Project. The State cannot adopt a course of action which would require release to the ocean of hundreds of thousands of acre-feet of water per year that is conserved by State and federal water projects and is earmarked and paid for by other interests.
>
> DWR Director, William Gianelli, 1968
> N. 604, Infra.

INTRODUCTION

The contrast between the two statements above illustrates the Delta dilemma in which the state project planners now find themselves. The first translates as, put the project on line and work out problems as they arise. Conversely, the second states

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the project has no flexibility to resolve the present problem.

The high water unit cost of the delivery and storage systems has reduced the projects flexibility. The question of Delta water quality maintenance was seriously considered after the state planners had contracted the full yield of the project, including the supplies that will be afforded by anticipated reservoirs.[580] Commitment of the maximum yield of the project to delivery was necessary to reduce the estimated unit water cost to a figure close to the potential service areas ability to pay and thereby consummate contracts for the repayment of the water - and the project.

Presently the federal Central Valley Project has surplus water to meet a high Delta water quality level but the Bureau of Reclamation is reluctant to commit storage water to Delta water quality maintenance. The Bureau contends only Congress can dictate the operation of the CVP project - not the state Water Resources Control Board. Litigation is now in progress to resolve this state vs. federal conflict.

This chapter opens by emphasyzing the importance of Delta water quality guarantees once the Peripheral Canal is constructed and a brief explanation of California water quality management nomenclature. Sections of the California Water Code are presented as they represent the Legislative approach to the Delta controversy and they guide the State Board in considering Delta water rights. The main thrust of this chapter is two pronged: the setting of Delta water quality objectives and Delta water quality standards. Both are moving targets undergoing change. However, they have been set in motion for a sufficient period of time for this writer to predict a water quality level that should stand for a few years. Figure 15, though simple in appearance, weaves a complex web in explaining the interrelationships between the various Delta water quality criteria, objectives and standards.

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[580] On the cost of project water see discussion accompanying Ns. 422, 444, and for the commitment of the project's yield see discussion accompanying Ns. 471-474. The Burns-Porter Act (1959) specified a portion of the $1.75 billion bonds authorized by the act would be placed in reserve to finance future storage units. Cal Water Code, Sec. 12935. Without this additional storage the project will be short about 3.2 MAF after should a critical dry year occur. See discussion accompanying N. 552 Supra

Characterized by a long period of uncertainty, Delta water quality decisions have been in a state of flux since the Spencer letter of 1957. The concluding section of this thesis points out the final resolution is several years in the future, but as slow as the courts may be, they are definite.

Delta Water Quality Levels and the Peripheral Canal

It has been pointed out that under the present system of exports the Delta is virtually assured of good quality water. A high Delta water quality must be maintained for the projects to export water of acceptable quality.[581] For example, from 1955 to 1965, a central Delta station recorded a monthly maximum chloride ion concentration, in critical months, one fourth of that proposed in the Decision 1379 standards.[582] With the Peripheral Canal, the quality of project export water will be independent of the quality of water in the channels and sloughs of the Delta. Water now used for outflows to protect the quality at the export pumps will be salvaged for export. Water quality in the Delta will then become an institutional decision. Thus, it cannot be overemphasized that the establishment of adequate Delta water quality levels is as critical to the Delta as the Peripheral Canal is to the projects. This is not to say the projects are independent of the establishment of Delta water quality levels. Standards or objectives translate into Delta outflows which impact directly on the projects; stored releases allocated to the Delta outflows for water quality maintenance cannot be exported.

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[581] See discussion accompanying Ns. 546, 547 Supra.

Water Quality Outflows and Nomenclature

The following point will probably become obvious to the reader but since the obvious is so often overlooked it should be stated here that none of the Delta water quality decisions contain Delta outflow requirements per se. Rather, water quality levels are called for at various monitoring stations. Outflows necessary to meet these levels are then estimated but due to the complex hydrology of the Delta the exact outflows are difficult to ascertain. Water quality levels for maintaining beneficial water uses in the Delta are the primary concern in the decision making. However, this writer concentrates on the estimated outflows associated with each decision to determine the impact of the decisions on the projects.

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[582] State Water Resources Control Board Delta Water Rights Decision 1379 (hereinafter referred to as D 1379), July 28, 1971, p. 27.

As a further introduction to this chapter an explanation of water quality nomenclature is in order. Federal agencies and laws often interchange the terms standards and objectives but in California, there is a distinct difference in water quality standards, State Water Resources Control Board-EPA water quality objectives, and SWP-CVP water quality objectives. Water quality standards define water quality levels associated with water rights. State Water Resources Control Board - U.S. Environmental Protection Agency objectives refer to the water quality levels to be maintained pursuant to anti-pollution statutes; SWP-CVP water quality objectives refer to quality requirements in contracts with project customers. Water quality criteria is an umbrella term that can be used for either objectives or standards. As stated, there is some federal-state variation in nomenclature but in the following discussion, the writer has adopted the well-defined state system for the purpose of aiding the uninitiated reader in understanding the different Delta water quality management programs.

THE DELTA AND THE CODE

This section should not be considered the last word on legal aspects of salinity control. This legal question is far more involved than a few sections of the California Water Code. The purpose of this presentation is to outline an overview of water rights management and the possible intent of the Legislature in regards to Delta Water Quality as expressed in the Code. A minimum of interpretation will accompany the sections presented here.[583]

Sec. 1201 - Adopted by California's first Legislature, this section enacts the common law of England as the law of California, recognizing the concept of riparian rights. Every property holder contiguous to or bordering on a natural body of water has a right to the water thereof. The right is not based upon use and is not lost by disuse nor is it superior to an appropriative right. The state does not have a statutory requirement for reporting riparian uses.[584]

Sec. 1450 - Referred to as the appropriative right, this right is based on the principle "first in time, first in right." Appropriative rights exercised after the Water Commission Act of 1914 must follow administrative procedure to be perfected. Those that grandfather the act are perfected by continuous use.[585]

Sec. 100 - Based on California Constitution Article XIV, Sec. 3, this right grew out of public dissatisfaction with the court's ruling in Herminghaus v. Southern California Edison Co. (1926). This section limits rights to that reasonably required for beneficial use. Unreasonable use or waste of water is forbidden.[586]

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[583] For a more detailed discussion of these statutes, see Cunningham, "Is Negotiation a Solution?", pp. 248-261; Gindler and Holburt, "Water Salinity Problems," pp. 362-376; SWRCB, D1379, pp. 7-19.

[584] For the legal interface between Sec. 1201 and Sec. 1450 see the U.S. Supreme Court's discussion in the Gelach Case in H. Doc. No. 246 (85:1), pp. 715-720.

[585] Ronald B. Robie, "The Delta Decision: Water Rights in a New Era".

Sec. 10000 - This section is the first section of Part 1, Division 6, of the Code. Division 6 is the "Conservation, Development, and Utilization" of State Water Resources and Part 1 is "Adoption of State Water Plan." Section 10000 and 10001 adopt the Plan as set forth in Bulletin 25. This bulletin calls for a 3,300 cfs outflow 6 miles west of Antioch.[587]

Section 11271 - "In the operation of... any... project... by the United States or the State, diversions from Sacramento-San Joaquin Delta sources of water shall not be made except when the residual surface outflow from the Sacramento-San Joaquin Delta is adequate to prevent the intrusion of ocean salinity at the town of Collinsville on the Sacramento River..." Gindler and Holbert state that this section is not effective if the operators choose to provide an overland supply pursuant to Sec. 12202.[588]

Sections 11460 and 11463 - Known as the Watershed Protection Act, these sections give a potential water user in a watershed a superior right to waters originating in the watershed over users outside the basin. If a resident can demonstrate a reasonable use of water, the exporter must relinquish his right without compensation.

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[586] H. Doc. No. 246 (85:1), pp. 535-536

[587] See text accompanying Ns. 210, 221, 227 Supra.

[588] Gindler and Holburt, "Water Salinity Problems," p. 380.

This state statute is binding on the state project but the extent to which it obligates the CVP is uncertain.[589]

Section 10505 - Known as the County of Origin Act, this section applies the same principles contained in Sec. 11460-11463 to the county in which waters originate.

Section 12931 - Passed in the Burns-Porter Act, this section declares that the Delta is within the watershed of the Sacramento River thereby providing the Delta the benefits of Secs. 11460-11463 as they pertain to the Sacramento watershed.

Sections 12200-12205 and Sec. 12220 are recognized as the Delta Protection Act. The first section recognizes the unique problems of the Delta and declares "...A general law cannot be made applicable to said Delta..." Section 12201 reiterates that the export of Delta water is subject to Secs. 10505 and 11460-11463. Section 12202 states that the SWP in coordination with the CVP shall provide salinity control and an adequate water supply for water users in the Delta. However, the section further states that the projects may provide a substitute water supply "...in lieu of that which would be provided as a result of salinity control..." Waters to which the Delta water users are entitled may not be diverted, as contained in Sec. 12203. Section 12204 forbids the exportation of water that is needed to fulfill the Section 12202 and Section 12203 requirements. Section 12220 defines the boundaries of the Delta (see Table II).

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[589] H. Doc. No. 246 (85:1), pp. 536-540. Engle in these pages supports the application of the statutes to the CVP as does the State Water Resources Control Board in Decision 1379, p. 7. It is interesting to note watershed protection language was written into the Congressional Authorization for the CVP New Melones Project. Infra N. 695.

Section 12934(d)(3) falls in Chapter 8, Water Resources Development Bonds, commonly known as the Burns-Porter Act. This section provides that "State Water Facilities" shall mean, among other things, "...facilities in the Sacramento-San Joaquin Delta for water conservation, water supply in the Delta, transfer of water across the Delta, flood and salinity control, and related functions."

ESTABLISHING DELTA WATER QUALITY OBJECTIVES

Of the various topics considered in this thesis, none is more important or complex than Delta water quality decision making. The source, occurrence in time and interrelationships of the decisions is presented in Figure 15. The figure does not stand alone but it serves as an aid to the text which follows.

Three vehicles were utilized to set Delta water quality criteria, objectives, and standards: negotiations between the project operators and Delta growers; water quality stipulations attached to water rights of the projects; and the Federal Water Pollution Control Act of 1965. The criteria grew out of the negotiations, but these have been overshadowed by the latter two which somewhat dovetailed into Decision 1379. Criteria and objectives are considered in this section, the following section discusses the water quality standards and the present Delta water quality litigation.

Negotiation: November 19, 1965 Criteria

The Bureau has been negotiating repayment and water deliveries with Sacramento River diverters for some time. Negotiations, lasting some twenty years, were complicated by the over-prescription of the natural flow, the difficulty of identifying and separating the project supply from natural flow, and the fact that storage releases were begun before contracts for repayment were secured. One of the most difficult issues involved is the identification of the diverter's water right allotments.

Based on several water right assumptions as to established priorities and uses, the Bureau was able to secure Sacramento River water rights contracts with 131 diverters. Delta growers and a few remaining upstream diverters have yet to sign.[590]

SWR joined the Bureau's negotiations with Delta diverters on May 24, 1963.[591] At this time, there was little assurance that the Delta diverters would be guaranteed any water quality levels other than those which DWR favored. To be sure, several legal channels remained open to the Delta water users; but in January, 1965, the Interagency Delta Commission (IDC) presented its Recommended Plan consisting of the Peripheral Canal with an incursion extending to Franks Tract (See Figure 13). Overland facilities to supply the Western Delta, the IDC report stated, "...should be provided as soon as practical after completing current negotiations and obtaining contracts for appropriate repayment for western Delta agricultural interests."[592] There was no stipulation that the in-channel quality would be maintained until the overland supply was constructed. The facilities would be constructed after: negotiation identified specific criteria; the overland supply area was precisely identified; and those in the service area agreed to "appropriate repayment." To date negotiation for the overland supply has been unsuccessful. Growers in the proposed service area are not in favor of the facility and DWR and the Bureau are yet to establish "...a common position on the need for, and the economics and physical nature of the overland supply."[593]

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[590] BOR, "Water Rights and Water Quality Problems in the Sacramento-San Joaquin Delta," n.d. This 14-page position paper was prepared in the aftermath of D1379. These settlements have been reviewed by one student as very favorable for the Bureau. See discussion in N. 215 Supra.

[591] DWR, Bull. No. 132-64, p. 106.

November 19 Criteria

On November 19, 1965, DWR, BOR, the Sacramento River and Delta Water Association, and the San Joaquin Water Rights Committee agreed to the first set of Delta water quality criteria.

The Association and the Committee represented the northern half of the Delta attenuating westward to include Sherman Island.[594]

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[592] Interagency Delta Committee, Plan of Development: Delta, p. 11, emphasis added.

[593] DWR, Bull. No. 132-74, p. 20.

[594] Map, DWR, Sacramento-San Joaquin Delta Area. 1 inch = 4 miles, December 7, 1965, in Appendix A, "Delta Water Quality Criteria," November 19, 1965, of DWR, The Delta and the State Water Project.

Known as the November 19th Criteria, the significance of the agreement merits their reproduction in Appendix B. As pointed out in the third paragraph of the agreement, the "...negotiating teams are not authorized to commit the groups and agencies that they represented..." and the criteria was approved "...as an appropriate basis for further negotiations leading to agreements..." The Delta growers have subsequently rejected the criteria,[595] while DWR advertized the criteria as state policy until they were upgraded in 1973.[596]

Briefly, the November 19 criteria would allow salinity intrusion of 1,000 ppm chlorides to move up to the Emmaton station in the Sacramento River and Jersey Point in the San Joaquin (see Fig. 13). This standard would be upgraded to 200 ppm chlorides for at least 10 consecutive days during April and May. Both standards would be relaxed in dry or critical years. Outflows necessary to maintain the criteria (except for the 10 day 200 ppm period) were estimated at 1,800 cfs by DWR,[597] but other researchers predict higher outflows.[598]

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[595] A Delta Water Agency with the power to assess the water users for salinity control was created by the Legislature in 1968 as codified in Sec. 12220 of the California Water Code. The Agency has rejected the November 19th Criteria, the Peripheral Canal, and repayment responsibility. According to testimony by DWR Director William Gianelli before the California Legislature, Assembly Committee on Water, November 9, 1972.

[596] Cunningham, "San Joaquin Delta: Negotiation?", p. 245. See discussion accompanying N. 621 Infra.

[597] DWR, The Delta and the State Water Project, p. 67.

DWR states (1969) the November 19th criteria "...is essentially equal to the level of salinity control presently resulting as a byproduct of transporting and protecting the quality of water pumped..." at the export facilities.[599] These criteria and operation have guaranteed protection for agriculture in the past, but an equally important consideration is the number of days the 1,000 ppm chloride line stays at the Emmaton and Jersey point stations. As storage capacity and diversions increase in the Sacramento River Basin, the stream will become more regulated. Large flood and spring runoff flows that push the salinity back well out of the Delta will be reduced, as well as surplus inflows.[600] Also the Peripheral Canal would provide a greater degree of control over the Delta hydrology.[601] The net effect of greater stream and Delta hydrologic regulation and maintenance of the November 19th criteria would be an incursion of greater duration than that which existed in the early years of the CVP. The total effect would actually be a greater incursion for the western Delta. Delta growers would have water of marginal quality for longer periods and the practice of irrigating after the growing season to leach salts from the root zone would be restricted. Irrigation water would have to be supplied in an overland facility to the western 12 to 15,000 acres.[602]

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[598] Federal Water Pollution Control Administration, San Joaquin Water Drain: Effects on Water Quality of San Francisco Bay and Delta, 1967, p. 73.

[599] DWR, The Delta and the State Water Project, p. 67.

[600] See discussion accompanying Ns. 112, 113 Supra.

[601] See discussions accompanying Ns. 546 and 588.

Probably the most significant aspect of the November 19th criteria is that state and federal water quality agencies did not participate in their development. This resulted in a major emphasis on the projects' ability to maintain the export standards--not the biological, municipal, industrial or agricultural needs. Also, DWR contracted the firm yield of the State Water Project with high water quality objectives before any type of salinity control standards were adopted. This puts the project in a precarious position as explained earlier[603] and stated by DWR Director Gianelli below:

> The project cannot live with criteria more restrictive than those of the November 19, 1965, agreement...the adoption of more restrictive criteria could...possibly destroy the financial integrity of the entire State Water Project. The State cannot adopt a course of action which would require release to the ocean of hundreds of thousands of acre-feet of water per year that is conserved by state and federal water projects and is earmarked and paid for by other interests.[604]

And:

> Increased salinity control above November 19 criteria would require: (a) denial of water users of water supplies they have contracted for and made

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[602] SWRCB, D1379, p. 30 and DWR, California State Water Project, November, 1974, p. 44.

[603] See discussion accompanying Ns. 550-551 Supra.

[604] Before the SWRCB, October 3, 1968, in Cunningham, "San Joaquin Delta: Negotiation?", p. 244.

> advanced payments for; or (b) construction of new water conservation and transportation facilities upstream from the Delta; or (c) both.[605]

The November 19 Criteria received a good deal of publicity, and for a few years it appeared that the standards would gain official status. Present (pending) standards and objectives for the Delta, however, share little resemblance to the November 19 criteria which have been difficult to dislodge. Vehicles for their displacement were provided by two separate sets of requirements which somewhat dovetailed into Decision 1379 by the State Water Resources Control Board.

Continuing Negotiation

Even though the establishment of Delta water quality objectives and standards have overshadowed water quality levels achieved through negotiation, negotiations have continued. In light of the standards and objectives now established the real purpose for these discussions is to agree upon the Delta's historic water quality right. Once this is identified then the parties involved can move towards an agreement as to how much, if any, the Delta water growers should pay the project operators for water quality maintenance in excess of their vested or historic right. Repayment is considered in the final chapter, it is mentioned here to identify the significance of the ongoing negotiations.

The Delta Water Agency was created by the Legislature in

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[605] DWR, The Delta and the State Water Project, p. 60.

1968 to negotiate their historical entitlement. The legislation stipulated that if a contract had not been concluded by December 31, 1973 the agency would terminate. Diversification among Delta interest in the agency has resulted in a lack of internal cohesion. One of the last official acts of the agency was the unanimous passage of Resolution No. 116 urging that the agency not be extended.

As illustrated in Fig. 14 the former Delta Water Agency now consists of six entities. The three Contra Costa Groups have been in existence for some time. The 1973 legislature created the North Delta Water Agency, the South Delta Water Agency and the Central Delta Water Agency. Negotiations will go forward with the two exporters and the individual agencies and districts.[606] One member of the State Board has stated, "...the Board intends to reconvene the Delta hearing unless adequate progress is being made..."[607] Since no visible progress has been made in the three years subsequent to this statement, it seems to have lost its validity. The writer feels the Board has encouraged negotiation in an indirect manner as discussed later.[608]

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[606] DWR, Bull. No. 132-74, p. 20.

[607] Ronald B. Robie, "The Subject of D. 1379" before the Southern California Water Conference, Los Angeles, Ca. February 14, 1972.

[608] See discussion accompanying N. 624 Infra.

Delta Objectives: R. 68-17, R. 73-16, Basin Plan

Delta water quality objectives were adopted pursuant to the Federal Water Quality Control Act of 1965. The first set of objectives were adopted in R. 68-17 in 1968. These objectives were generally recognized as inadequate and the state committed itself to further consideration of additional objectives. This commitment was carried through with the adoption of higher objectives in R. 73-16 in 1973. However, two beneficial uses were still not adequately protected and they are to be upgraded in the Central Valley Regional Basin.

Resolution No. 68-17

In the same year the November 19th Criteria were set forth, Congress passed the Federal Water Quality Control Act of 1965 instructing the states to establish water quality objectives for interstate and coastal waters (which included the Delta) and submit these objectives to the Secretary of the Interior by 1967 for approval. Failure to submit any objectives or the submission of inadequate objectives by a state would result in the federal government's establishing the objectives.[609]

Initially, DWR had this reaction:

> ...It is not possible to clearly estimate the impact the Water Quality Control Act of 1965 will have upon the State Water Project. It appears

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[609] DWR, Bull. No. 132-66, p. 8. For an analysis and legal history of this law see Philip P. Micklin, "Water Quality: A Question of Standards," in Congress and the Environment edited by Richard A. Cooley and Geoffrey Wandesforde-Smith (Seattle, Washington: University of Washington Press, 1970), pp. 112-129.

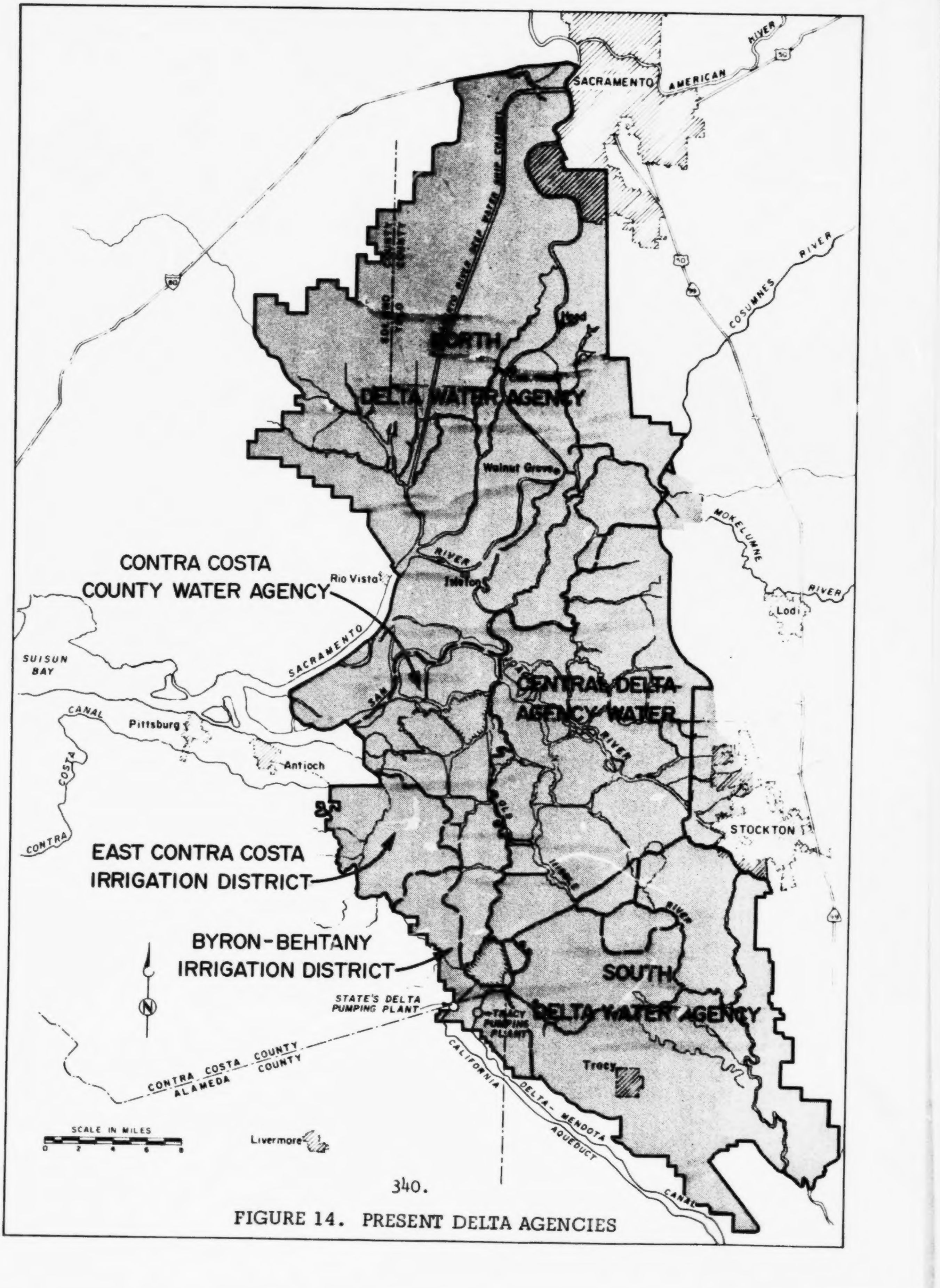
SACRAMENTO
AMERICAN
RIVER
50
80
COSUMNES
RIVER
99
NORTH
DELTA WATER AGENCY
Hood
Walnut Grove
MOKELUMNE
RIVER
CONTRA COSTA
COUNTY WATER AGENCY
Rio Vista
RIVER
Isleton
Lodi
SUISUN
BAY
SACRAMENTO
SAN
CENTRAL DELTA
AGENCY WATER
CANAL
Pittsburg
Antioch
RIVER
COSTA
CONTRA
STOCKTON
EAST CONTRA COSTA
IRRIGATION DISTRICT
RIVER
BYRON-BEHTANY
IRRIGATION DISTRICT
SOUTH
DELTA WATER AGENCY
N
STATE'S DELTA
PUMPING PLANT
TRACY
PUMPING
PLANT
CONTRA COSTA COUNTY
ALAMEDA COUNTY
CALIFORNIA
DELTA-MENDOTA
AQUEDUCT
CANAL
Tracy
SCALE IN MILES
0 2 4 6 8
Livermore

FIGURE 14. PRESENT DELTA AGENCIES

> possible that the Federal Government could fund those costs of project facilities allocated to the purpose of water quality control, insofar as interstate streams are affected, such as the cost of augmenting salinity control releases in the specific case of the Delta Facities.[610]

Two significant deductions can be made from the foregoing statement. First, DWR definitely considered salinity control would come under the act; and second, DWR indicated salinity control would have to be upgraded. As illustrated below these statements vary somewhat from subsequent positions.

Pursuant to the requirements contained in the Federal Water Quality Control Act, the Central Valley Regional Water Quality Control Board issued water quality objectives for the Delta in April, 1967.[611] Nineteen characteristics such as nitrogen content, bacteria and dissolved oxygen, were included; chloride was included as point 17 which is reproduced below:

> 17. Chloride concentration shall be maintained below these limits:
>   A. Rock Slough at Contra Costa Canal Intake;
>   a. 250 mg/l, mean tidal cycle value, and
>   b. 100 mg/l, mean tidal cycle value, for at least 65% of any year.
>   B. San Joaquin River at the City of Antioch Water Intake;

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[610] Ibid., p. 8.

[611] Central Valley Regional Water Quality Control Board, "Water Quality Control Policy for Sacramento-San Joaquin Delta," 1967. For a background on the administration of water quality in the state see N. 613 Infra.

a. 100 mg/l, as measured 1-1/2 hours after high tide, at least 50% of any year, and

b. 250 mg/l, as measured 1-1/2 hours after high tide, at least 60% of any year.

C. Cache Slough at City of Vallejo intake; 100 mg/l.

D. San Joaquin River at Jersey Point; 250 mg/l, as measured 1-1/2 hours after high tide, at least 79% of any year.[612]

The objectives were then submitted to the State Water Quality Control Board. This board was merged with the State Water Rights Board to form the State Water Resources Control Board in 1967, but at this time it was made up of fourteen members, five of which were ex officio state officials including the DWR Director.[613] Perhaps swayed by DWR's position that the FWQCA of 1965 pertained only to the "abatement of waste discharge" and not to salinity, a natural phenomenon, the State Water Quality Control Board struck out the 17. B and 17. D requirement of the Delta salinity objectives before the state objectives were submitted to the Secretary of the Interior on June 23, 1967.[614]

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[612] Ibid., p. G-3.

[613] In 1949 the Dickie Act layed the groundwork for the present system of water quality management in the state by establishing the nine regional water quality control boards and the State Water Pollution Control Board. In 1967 the State Water Resources Control Board was formed by the merger of the State Water Rights Board and the part-time State Water Quality Control Board (nomenclature changed from State Water Pollution Control Board in 1962). The responsibility of the State and Regional Boards was substantially enlarged by the enactment of the Porter-Cologne Act which became operative on January 1, 1970. See Ronald B. Robie, "Water Pollution: An Affirmative Response by the California Legislature," The Pacific Law Journal, Vol. 1, No. 1 (January, 1970). Natural boundaries such as hydrologic divides were utilized to form the boundaries of the regional boards. These regions include one or more complete basins or the portion thereof within the state. The one exception is the boundary between the Central Valley Regional Water Quality Control Board and the San Francisco Regional Water Quality Control Board. This boundary crosses the Sacramento River just west of Sherman Island.

The Cache Slough requirement is easily maintained as it is on the Sacramento River and the Bureau must meet the Rock Slough requirement to export water via the Contra Costa Canal.[615] Thus, these remaining chloride objectives would have little impact on the projects.

Secretary Udall rejected the objectives for the Delta and appointed a Department of Interior task force which developed proposed salinity objectives. On October 24, 1968, the State Water Resources Control Board by Resolution 68-17 adopted "The Supplemental Water Quality Control Policy for the Sacramento-San Joaquin Delta," which the state Board clearly states are the November 19 Criteria.[616] The State Board also stated that the question of additional objectives for the spawning of striped bass would be resolved in upcoming Delta water rights hearings (discussed in the next section). Resolution 68-17, however, did not include two requirements recommended by the Interior task force for municipal and industrial water use and the spawning of striped bass in the western Delta.

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[614] DWR's brief can be found in The Delta and the State Water Project, pp. 82-88. The State Board submitted the document prepared by the Central Valley Regional Board (Supra, N. 611). The salinity standards were lined out.

[615] Supra N. 288.

[616] State Water Resources Control Board, Resolution No. 68-17, October 24, 1968, p. 1. (Mimeographed). Reproduced in Appendix B.

After commending the State Water Resources Control Board "...for a fine job of standards [objectives]-setting..." and praising the objectives as, "...good ones, well documented and, with few exceptions, fully adequate to protect the quality and uses of...interstate waters," the lame duck Secretary of Interior strengthened three objectives and recommended actions on a few others. On the subject of the supplemental policy for the Delta, the Secretary said:

> This Supplemental Policy augments and strengthens the salinity standards [objectives] of the June 1967 Policy, but it differs significantly from proposed standards [objectives] which the Interior task force developed in that important water uses of the Delta are left unprotected. These are the spawning of striped bass and the municipal, industrial and agricultural water uses of the western part of the Delta. The State Board action recognized that further consideration of additional standards [objectives] pertaining to these unprotected uses was necessary. Accordingly, the Board has stated that it will conduct public hearings during 1969 and will consider before June 30, 1970, the matter of supplementing the salinity standards [objectives] now established.
>
> In reliance upon your State Board's commitment and, of course, reserving the position of the United States as a participant in such hearings as the holder of water rights for the Central Valley Project, I have approved the Delta salinity standards [objectives] as submitted as far as they go.[617]

The Secretary further committed the CVP, on an interim basis, to two requirements included in the Interior task force objectives. The objectives read:

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[617] Letter from Stewart L. Udall, Secretary of the Interior, to Ronald Reagan, Governor of California, January 9, 1969. Reprinted in Appendix C.

> B2: Above the Three Mile Slough in Sacramento River and between Jersey Point and Venice Island in San Joaquin and False Rivers, except in below normal, dry and critical years, there shall be maintained a daily mean total dissolved solids concentration of:
>
> a. 350 milligrams per liter or less from April 1 until the water temperature at these locations reaches 60 F.
>
> b. 180 milligrams per liter or less thereafter for five weeks.
>
> B5: Within the normal operating capability of local, state and Federal water projects there shall be maintained at Antioch in the San Joaquin River a mean total dissolved solids concentration of 450 milligrams per liter when measured on the basis of the average of the daily mean values for any 10 consecutive days throughout a period of at least 150 days each water year.[618]

The Secretary did not, however, submit the CVP to the authority of the State Water Resources Control Board as, "...The Department [of the Interior] must also reserve its freedom of action with respect to the operation of the Central Valley Project..."[619]

As discussed in a subsequent section, the water rights hearings alluded to above were held from July 1969 to October 1970 and the resultant water rights Decision 1379 was issued in July 1971. This decision incorporated the B2 and B5 criteria (presented above) with minor changes.

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[618] Ibid. The commitment made in this letter was to expire in September, 1972. Prior to this date Secretary continued the commitment on an interim basis. This letter is reproduced in Appendix C.

[619] Ibid.

Resolution No. 73-16

Fulfilling its water quality management commitment for supplemental objectives, the State Board on April 19, 1973 adopted Resolution No. 73-16, "Water Quality Control Policy Supplementing State Water Quality Control Policy for the Sacramento-San Joaquin Delta." In essence the policy adopted the B2 and B5 objectives that were developed by the Secretary of the Interior and incorporated in D1379 as standards.[620] Agricultural objectives in R68-17 were not altered in R73-16. On June 20, 1973, EPA approved the R73-16 objectives.[621]

Since the agricultural objectives are inadequate to protect irrigation in the western 12-15,000 acres[622] of the Delta and since D1379, containing standards adequate to protect this beneficial use, is in a cloud of legal uncertainty - including a court injunction against the implementation of the Decision,[623] the writer is at a loss to explain why the State Board did not upgrade the agricultural objectives. Perhaps, the State Board wanted to give the matter more attention, further refine the level of protection needed, and incorporate these objectives in the Central Valley Regional Water Quality Control Plan (Basin Plan) (presented below) which was being formulated at that time. Since the Central Valley Basin Plan does contain upgraded objectives, this explanation may be valid. Another possibility, however, is the State Board wanted to encourage the successful negotiation between the Delta growers and the project operators. The absence of adequate objectives from the time of the D1379 injunction in 1972 to the adoption of the Plan in June 1975 might encourage the irrigators to negotiate and secure a water quality level which the projects would then maintain.[624]

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[620] The secretary's B2 B5 objectives are reproduced in the text accompanying N. 618. R.73-16 is reproduced in Appendix B and Fig. 5 illustrates the objectives in D1379.

[621] DWR, Bull. No. 132-73, p. 20.

[622] See text accompanying N. 602 Supra.

[623] See text accompanying N. 673 Infra.

This writer's indulgence in guessing the State Board's reasoning should not mask the observation that except for the brief period D1379 was operative, water quality objectives in the western Delta have been inadequate to protect irrigation. The Central Valley Basin Plan to be adopted in June, 1975 will upgrade these objectives to protect this beneficial use.

As illustrated in Fig. 15 a similar observation, without explanation, is made in regards to Delta water quality for opossum shrimp (Neomysis awatchensis) which is recognized as the principal food of juvenile striped bass.[625] Standards for the maintenance of an adequate population of this organism were incorporated in D1379 but when D1379 was set aside by a temporary injunction in 1972, this standard was not adopted as an objective in R. 73-16 in 1973. It appears, however, that the Neomysis standard will be adopted as an objective in the Central Valley Basin Plan.

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[624] One Board member expressed a strong personal desire that these negotiations reach fruition. See text accompanying N. 607 Supra.

[625] SWRB, D1379, p. 21.

As discussed earlier, with the present pumping system water quality in the Delta is adequate to protect all the beneficial uses and the significance of the objectives and standards will not be realized until the Peripheral Canal is constructed.[626] And since the Basin Plan, containing the upgraded objectives will be implemented long before the Canal goes on line, the Board's postponement of upgrading the objectives will have no negative impact on Delta water quality.

Central Valley Regional Water Quality Control Plan

Water quality objectives in the R. 68-17 and 73-16 objectives are now being implemented through the granting of waste discharge requirements by the Central Valley Regional Board and the issuance of water rights permits by the State Board. These ministerial functions are guided by the Regional Water Quality Control Plans presently in preparation. The Comprehensive Water Quality Control Plan: Central Valley Region will incorporate the R. 68-17 and the R. 73-16 objectives plus additional objectives as explained below.

The state Porter Colone Act of 1969 required the nine Regional Water Quality Control Boards in the state to develop and submit to the State Board for adoption, Interim Water Quality Control Plans for their respective basins.[627] The interim plan for the

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[626] See discussion accompanying Ns. 581, 582 Supra.

[627] Ca. Water Code Sec. 13240.

Central Valley Region contains the water quality objectives in R.68-17.[628] Final plans are now in preparation for 16 basins within the nine designated water quality management regions of the state. Since the planning program is organized on a basin by basin approach, the Comprehensive Water Quality Control Plans have become known as Basin Plans.[629] Unless otherwise noted, Basin Plan in this thesis refers to the Comprehensive Water Quality Control Plan: Central Valley Basin.

The state water quality planning program was given added emphasis in October 1972 with the passage of federal Public Law 92-500. Sec. 303(e) of the law, calling for the formulation of strong plans to guide state and federal administrators in the management of water quality, underlines and strengthens the Plans.[630] California is to submit these plans to EPA by June, 1975.

As this thesis was being finalized, a few of these plans had been reviewed by the public and adopted by some of the Regional Boards and the State Board. The Central Valley Regional Water Quality Control Plan is scheduled for adoption by the Central Valley Regional Water Quality Control Board and the State Board in June,

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[628] Central Valley Regional Water Quality Control Board Interim Water Quality Control Plan July, 1971. pp. 46, 47, 48.

[629] For example, almost every speaker at the State Senate hearings identified in N. 634 *Infra.* referred to the plans as Basin Plans.

[630] 86 Stat. 816 (Commonly referred to as P.L. 92-500) Sec. 303(e).

1975.[631] State Board staff has furnished the writer with a draft of Delta objectives which will be incorporated in the Plan. While the objectives call for water quality levels at several stations, only pertinent[632] sections are herein reproduced:

> [Agriculture]
>
> (2) At Blind Point on the San Joaquin River, the running average of mean daily values [electrical conductivity] for any 14 consecutive days shall not exceed the following values (millimhos/cm):

Type of Year	Months	
	AMJJ	ASOND
Non-critical	2.2	3.1
Critical	3.6	3.6

> [Municipal and Industrial (B5)]
>
> (8) At Antioch, in the San Joaquin River, the average of mean daily TDS for any 14 consecutive days shall not exceed 450 mg/l [Cl⁻] throughout a period of at least 150 days in each normal or below normal water year; provided, however, that the period is reduced to 120 days during dry water years and 100 days during critical water years. These objectives shall not apply when the SWRCB determines that adequate substitute supplies are available to all existing municipal and industrial water users located in the vicinity of Antioch and Pittsburg.

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[631] Jim Giannopolous, Planning Division, State Water Resources Control Board, telephonic communication, March 27, 1975.

[632] Pertinent in this case applies to the stations that must be maintained with the maximum Delta outflow. See discussion accompanying N. 657.

[Fish and Wildlife (B2]

> (1) For five weeks, beginning when the water temperature at Antioch has increased to 60°F, the 14-day running average of mean daily salinities in the San Joaquin River at the Antioch Water Works Intake and at Prisoners Point shall not exceed 1,500 micromhos/cm and 550 micromhos/cm (approximately 1,000 and 350 mg/l TDS), respectively, provided that this objective may be modified in any year, when required, for experimentation concerning fishery requirements being carried out in accordance with a plan approved by SWRCB and concurred by the EPA.

[Neomysis]

> (5) A mean daily chloride concentration of 4,000 mg/l shall be maintained in waters east of the westerly end of Chipps Island.[633]

As a part of the Basin Planning effort, these objectives plus other aspects of the plan have been reviewed during several public hearings and they will be reviewed once again by the Central Valley Regional Water Quality Control Board and again by the State Board.[634] However, the reader should realize that the objectives presented above in excess of those contained in R. 68-17 and R. 73-16, are tentative until they are adopted by the Central Valley Regional Water Quality Control Board, the State Board and EPA.

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[633] State Water Resources Control Board, Delta Water Quality Objectives, working draft copy transmitted from Jim Giannopolous, State Water Resources Control Board, Planning Division, to John MacDiarmid, March 28, 1975.

[634] Approximately 250 public hearings and workshops have been held throughout the state for the Basin Plans. Direct cost of public participation in the planning process is almost one-half million dollars. W. W. Adams, Chairman, State Water Resources Control Board, testimony before the California Legislature. Senate Committee on Agriculture and Natural Resources. Hearings on the effect on California Agriculture of the basin water quality control plans, March 18, 1975.

A cursory review of the D1379 standards (see Appendix B) reveals a strong relationship between these standards and the objectives reproduced above. In regards to agriculture, electrical conductivity is relaxed slightly in April through July from 2 to 2.2 millimhos while the August through November level is upgraded from 3.6 in D1379 to 3.1 millimhos in the Basin Plan.

M & I objectives are the same level as those in D1379 and R.73-16. Fish and wildlife objectives are the same level as those in D1379 and R.73-16. The fish and wildlife standard in D1379 is repeated verbatum in the above.

Summary and Status

With the exception of the slight variation of agricultural objectives the Basin Plan water quality levels are the same as those in D1379. Since some of the objectives originated in D1379 a discussion including estimated outflows is presented with D1379.[635]

The mechanization of how the projects will be subscribed to the maintenance of the objectives as set forth in the resolutions and the Plan is left to be discussed. As prolog to this institutional and legal question, an interesting set of legal circumstances and interpretation is presented.

When the court granted the injunction against D1379 (subsequent discussion), it forbade the State Board from implementing any part of the decision or using any of the information collected in the hearings. According to DWR this included the submission of the objectives in R. 73-16 to the EPA for approval.[636] The State Board contends that since separate hearings and conclusions, though nearly identical, were utilized to derive the objectives in R. 73-16, they were in abeyance with the court order.[637] The court did not restrain the State Board from adopting objectives and under the commitments made pursuant to the Federal Water Quality Act of 1965 the State Board had an obligation to develop and adopt adequate objectives for the Delta waters.[638] Both sets of arguments would apply to the adoption of the D1379 standards in the Basin Plan.

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[635] See discussion accompanying N. 653 Infra.

The Basin Plan for the Central Valley Region will contain the objectives presented earlier and the State Board will consider the maintenance of these objectives in the issuing of water rights permits and the Central Valley Regional Water Quality Control Board will utilize them in issuing waste discharge requirements. No water rights permit and no discharge requirement will allow for the degradation of the waters of the Delta beyond the objectives in the Central Valley Regional Water Quality Control Plan.[639]

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[636] DWR, Bull. No. 132-72, p. 17.

[637] Charles Shoemaker, Legal Division, State Water Resources Control Board, Telephonic Communication, January 2, 1975.

[638] This obligation was identified by the Secretary of the Interior. See letter accompanying N. 617 Supra.

[639] Ca. Water Code Secs. 174, 1242.5, 1258 in SWRCB, D1379, p. 17.

Due to the pending litigation the future status of these enforcement abilities, however, is in question. The D1379 case is a legal test of the reasonableness of the decision. State statutes authorize the State Board to condition water rights in the interest of water quality.[640] Thus, there is no question over the Board's jurisdiction over the SWP. As presented in the next section, the U.S. vs. Ca. case is to determine whether or not the State Board can condition water rights of federal projects. Sec. 8 of the Reclamation Law requires the Bureau to apply for a water right and respect the right as would any other diverter. However, the Bureau contends this should not give the water right grantor the authority to modify the operation of the congressionally authorized project.[641]

The writer will not prejudge the courts but should the decision be against the state, the Board will have lost its most effective tool for maintaining downstream water quality. In a separate case involving a similar but not same principle, the Federal 9th Circuit Court of Appeals ruled that federal installations must meet waste discharge requirements issued to the installations by the state.[642] The problem here is, reservoirs do not discharge waste and, therefore, they do not need waste discharge requirements. Thus, regulation of federal reservoirs could depend upon cooperation by the operator of the reservoir or the power of EPA to force another arm of the federal government to contribute towards the maintenance of the State Board - EPA objectives.

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[640] Ibid.

[641] See discussion accompanying N. 677 Infra.

[642] Stockton Record. March 3, 1975. Editorial page.

The reader may recall from above that the Secretary of the Interior reserved the independent position of the Bureau vs. the State Board when he obligated the CVP to the B2, B5 water quality objectives.[643] Nevertheless, the Secretary called for the State Board to adopt additional objectives to supplement those in R. 68-17. Did the Secretary imply that the most restrictive objectives would only apply to the SWP or was it his contention that the Bureau would obligate the CVP to help maintain the objectives on a volunteer basis providing the objectives were reasonable? In the mind of the writer, the latter was controlling.

The position of the federal government is similarly uncertain in regards to the planning objectives. As stated, P.L. 92-500 requires the states to develop Comprehensive Water Quality Control Plans and submit them to EPA. EPA will approve chapter two, Beneficial Water Uses, and chapter four, Water Quality Objectives to maintain these beneficial uses providing, of course, EPA considers the chapters adequate to meet the objective of 92-500, "... to restore and maintain the chemical, physical, and biological integrity of the nation's waters."[644]

EPA takes the position Sec. 313 of 92-500 requires the federal reservoir operators to contribute towards the maintenance of the objectives. A portion of Sec. 313 is herein reproduced.

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[643] See text accompanying N. 619 Supra.

[644] 86 Stat. 816, Sec. 101. (a).

> SEC. 313. Each department, agency, or instrumentality of the executive, legislative, and judicial branches of the Federal Government (1) having jurisdiction over any property or facility, or (2) engaged in any activity resulting, or which may result, in the discharge or runoff of pollutants shall comply with Federal, State, interstate, and local requirements respecting control and abatement of pollution to the same extent that any person is subject to such requirements, including the payment of reasonable service charges...

In the opinion of this writer, Sec. 313 as it applies to federal reservoirs may never see a court test. It takes little imagination to realize the unfavorable image the Bureau would cast if it failed to cooperate with the SWP plus all waste dischargers including federal installations to meet the established water quality objectives. The Bureau is not an autonomous entity, it needs public support which translates into congressional support which yields projects.[645] This writer feels that should the courts rule in favor of U.S. in U.S. vs. Ca., the Bureau will continue to proclaim its independence while at the same time cooperate with the State and EPA in meeting water quality objectives. Albeit, this cooperative spirit could fade under stress such as the restriction on the filling of New Melones[646] or a case in which the Bureau does not have a sufficient water supply to meet both water quality

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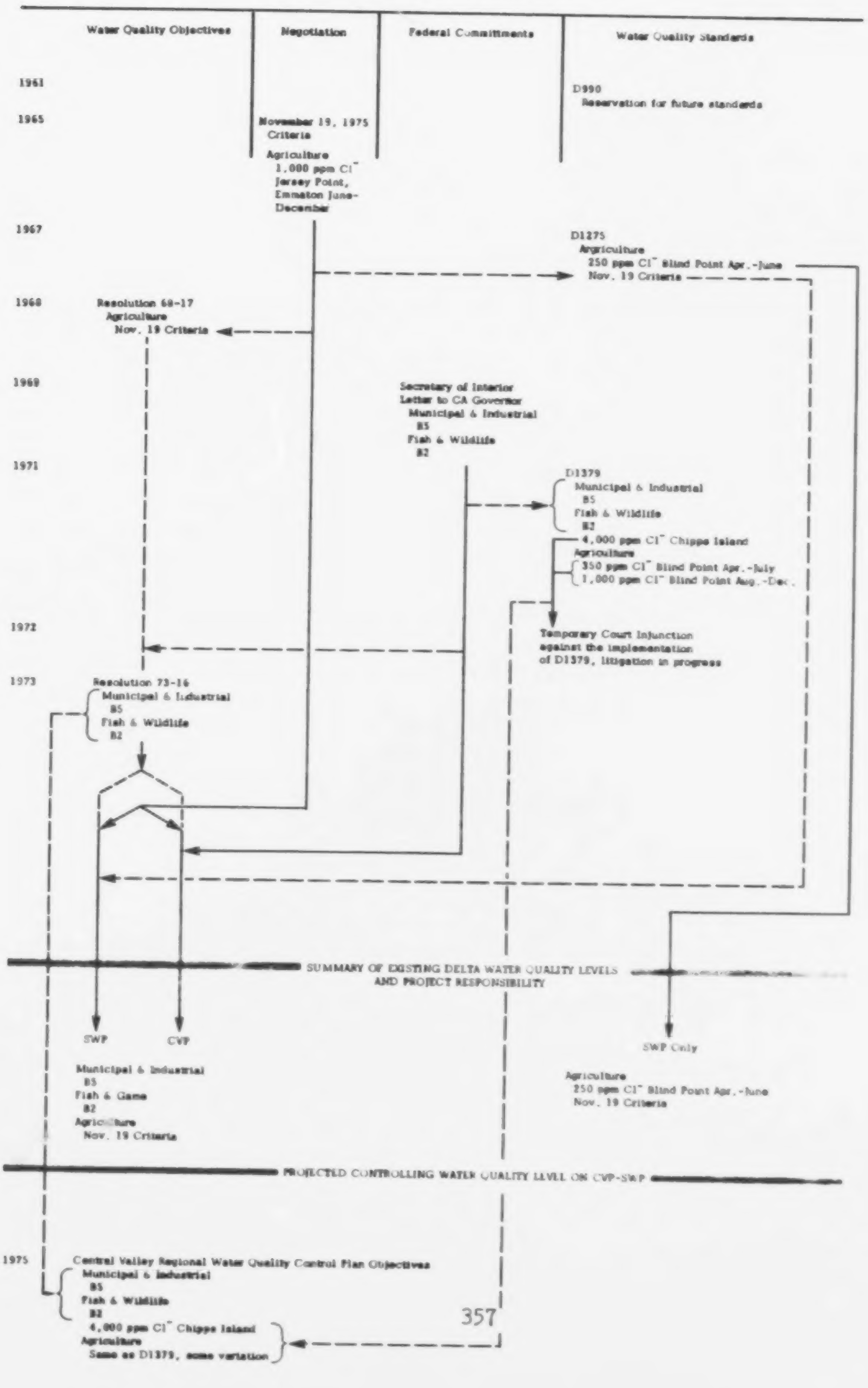
[645] See Billy E. Martin, Regional Director, U.S. Bureau of Reclamation testimony before the California Legislature, Senate Committee on Agriculture and Water Resources Hearings on Statewide Water Supply and Demand. January 14, 1975.

[646] See discussion accompanying N. 699 Supra.

FIGURE 15
DELTA WATER QUALITY DECISION TREE


Water Quality Objectives
Negotiation
Federal Committments
Water Quality Standards
1961
D990
Reservation for future standards
1965
November 19, 1975
Criteria
Agriculture
1,000 ppm Cl⁻
Jersey Point,
Emmaton June-
December
1967
D1275
Argriculture
250 ppm Cl⁻ Blind Point Apr.-June
Nov. 19 Criteria
1968
Resolution 68-17
Agriculture
Nov. 19 Criteria
1969
Secretary of Interior
Letter to CA Governor
Municipal & Industrial
B5
Fish & Wildlife
B2
1971
D1379
Municipal & Industrial
B5
Fish & Wildlife
B2
4,000 ppm Cl⁻ Chipps Island
Agriculture
350 ppm Cl⁻ Blind Point Apr.-July
1,000 ppm Cl⁻ Blind Point Aug.-Dec.
1972
Temporary Court Injunction
against the implementation
of D1379, litigation in progress
1973
Resolution 73-16
Municipal & Industrial
B5
Fish & Wildlife
B2
SUMMARY OF EXISTING DELTA WATER QUALITY LEVELS
AND PROJECT RESPONSIBILITY
SWP
CVP
Municipal & Industrial
B5
Fish & Game
B2
Agriculture
Nov. 19 Criteria
SWP Only
Agriculture
250 ppm Cl⁻ Blind Point Apr.-June
Nov. 19 Criteria
PROJECTED CONTROLLING WATER QUALITY LEVEL ON CVP-SWP
1975
Central Valley Regional Water Quality Control Plan Objectives
Municipal & Industrial
B5
Fish & Wildlife
B2
4,000 ppm Cl⁻ Chipps Island
Agriculture
Same as D1379, some variation

objectives and service area requirements. For this reason the writer would like to see the Bureau committed to water quality maintenance by something stronger than a spirit of cooperation.

ESTABLISHING DELTA WATER QUALITY STANDARDS

The introduction to this chapter defined the differences between water quality objectives and standards. Both water quality levels are set by the State Water Resources Control Board. The establishment of water quality objectives is a water quality management function while the water quality objectives are water quality considerations in the granting of water rights. The following section traces Delta water quality considerations in the two project's water rights. Since Decision 1379 is now in the courts, this section closed with a discussion of the adjudication in progress and other water rights decisions that have led to the litigation.

Delta Standards: Decision 1379

Pre D1379 water rights decisions for the projects reserved jurisdiction for further consideration of Delta water quality control which was enacted with D1379. Subsequently, the legal question of Delta water quality control has expanded to consider the broader question of state v. federal when water quality must be maintained by a federal reservoir.

Decisions 990 and 1275

Separate water rights hearings were held for the two projects to store and divert water. In February, 1961, the State Water Rights Board adopted Decision D990 for the CVP and Decision D1275 was adopted for the SWP in May, 1967. All told, the two hearings lasted 115 days, collected 17,500 pages of testimony and received 1,450 exhibits. Salinity control received the majority of attention in both hearings and the Board retained continuing jurisdiction over both permits to revise or formulate conditions and terms relative to salinity control.[647] Thus, the issued water rights stipulate that the projects may have to provide additional salinity control. As will be discussed later, this additional control was established for an interim period with Decision 1379.

In Decision D990, the State Water Rights Board traced the historical CVP salinity control commitment with the following conclusion, "It follows from the foregoing that salinity control in the Delta is one of the purposes of the federally authorized Central Valley Project."[648] After noting the large surplus of storage water in the river due to low demands for CVP water at that time, the Board further concluded:

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[647] California Legislature, Senate, Senate Select Committee on Salinity Intrusion in Agricultural Soils, Intrusion of Ocean Salinity, San Francisco Bay and Sacramento-San Joaquin Delta: A Progress Report to the Legislature, January 4, 1971, pp. 9, 10.

[648] State Water Rights Board, Decision D990.

> ".... There is no impending emergency requiring imposition of specific permit terms relative to salinity control at this time. Rather, the Board will reserve jurisdiction for a reasonable period, not to exceed about three years subject to further extension..."[649]

Decision D1275 (May, 1967) for the State Water Project was less favorable. In the absence of a western Delta overland supply system, DWR was required to maintain a chloride ion content not to exceed 250 ppm at Blind Point on the San Joaquin River (see Fig. 14) and the November 19th Criteria from July 1 to November 30. Blind Point, located on the western tip of the Delta, is below the lowest agricultural intake on the San Joaquin and if the quality of water at this point is suitable for irrigation, the water throughout the Delta is suitable for this use.[650] DWR was forbidden from storing or diverting water if the Blind Point criteria were exceeded. DWR estimated the Blind Point criteria would require a 6,000 cfs outflow, though this figure may be over estimated.[651] Similar to the reservation in D990, the Board reserved jurisdiction on Delta salinity control.[652]

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[649] Ibid., p. 58.

[650] SWRCB, D1379, p. 31.

[651] In D1379 the 250 ppm criteria was relaxed to 350 ppm which the SWRCB calculated could be maintained with a 2,500 cfs outflow. SWRCB, D1379, p. 31. This figure is probably conservatively low and the actual figure is somewhere in between. The complex problem of estimating outflow for the various standards and objectives is discussed between Ns. 656-657 Infra.

[652] DWR, The Delta and the State Water Project, pp. 78, 79.

Decision 1379

Exercising the salinity control reservations in D990 and D1275 the State Board opened the Delta hearings on July 22, 1969; they ended in April 1971. In all, 60 witnesses for 31 parties presented 11,700 pages of testimony, most of it conflicting.[653] After three months of deliberation, Decision 1379 was announced on July 28, 1971.

The Board concluded there was insufficient data to set definite standards to insure an adequate quality for all beneficial uses. Decision 1379, therefore, is an interim decision to be met while both projects have a surplus of water. A total of 32 stations to monitor 23 different water quality parameters (not all at every station), are required of the two project operators during this interim period.[654] Major stations are located in Fig. 16. Hearings will reconvene by July 1, 1978, to consider a final set of standards with the information provided by the new monitoring data.[655]

Reproduced in Appendix B, the D1379 standards consider all the beneficial uses of waters in the Delta and the level of protection necessary to maintain these uses. Beneficial uses identified include agricultural supply, protection of fish and wildlife, and municipal and industrial supply.

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[653] The Sacramento Bee, July 29, 1971, p. A1.

[654] State Water Resources Control Board, Decision 1379, p. 38.

[655] Ibid., p. 50.

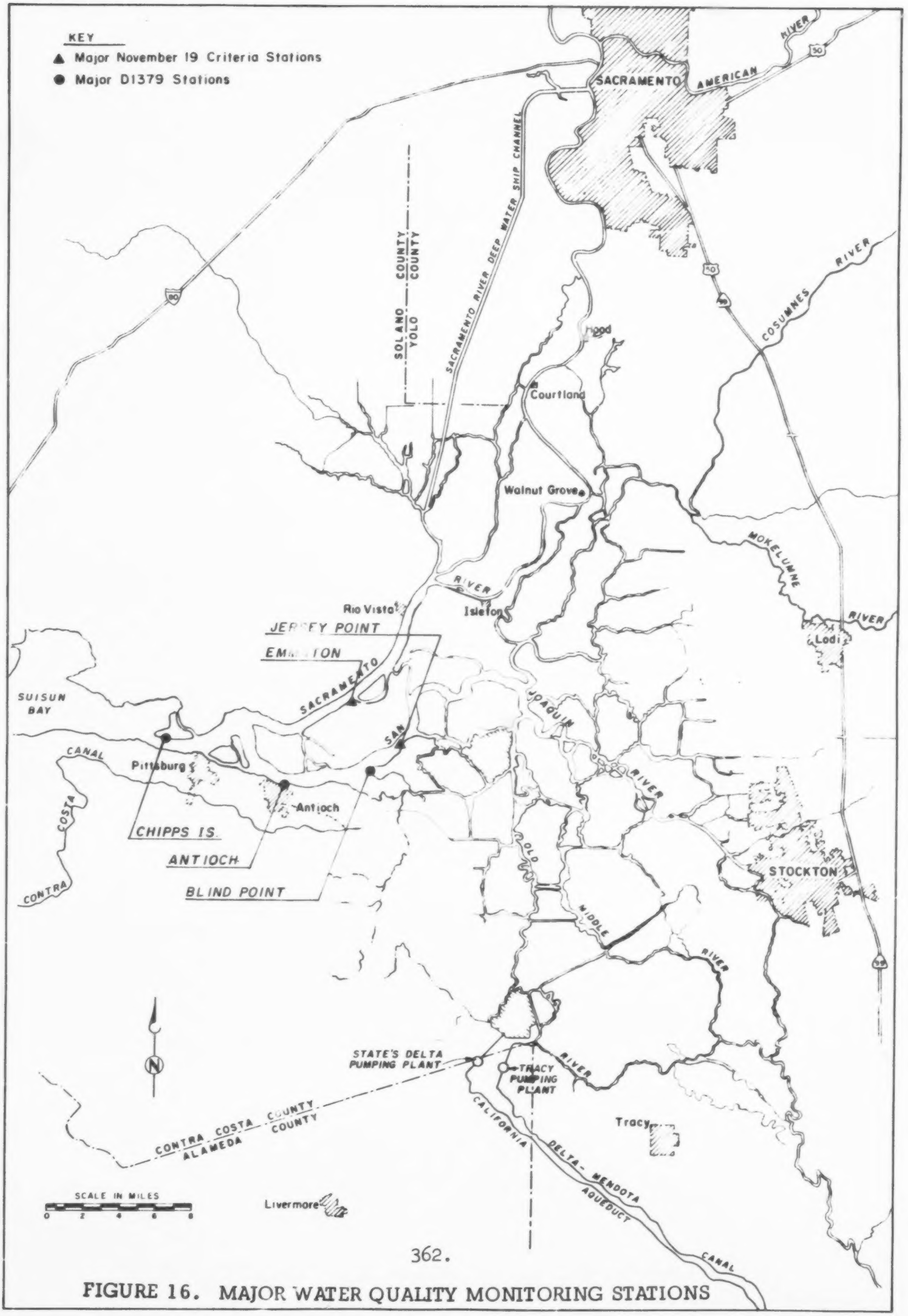
KEY
▲ Major November 19 Criteria Stations
● Major D1379 Stations
SACRAMENTO
AMERICAN RIVER
50
SACRAMENTO RIVER DEEP WATER SHIP CHANNEL
SOLANO COUNTY
YOLO COUNTY
80
COSUMNES RIVER
Hood
Courtland
Walnut Grove
MOKELUMNE RIVER
RIVER
Rio Vista
Isleton
Lodi
JERSEY POINT
EMMATON
SUISUN BAY
SACRAMENTO
SAN JOAQUIN RIVER
CANAL
CONTRA COSTA
Pittsburg
Antioch
CHIPPS IS.
ANTIOCH
BLIND POINT
STOCKTON
OLD
MIDDLE RIVER
99
N
STATE'S DELTA PUMPING PLANT
TRACY PUMPING PLANT
RIVER
CALIFORNIA
DELTA-MENDOTA AQUEDUCT CANAL
Tracy
CONTRA COSTA COUNTY
ALAMEDA COUNTY
SCALE IN MILES
0 2 4 6 8
Livermore

FIGURE 16. MAJOR WATER QUALITY MONITORING STATIONS

Upper limit agricultural quality standards were set at an electrical conductivity (E-C) of 2 millimhos[656] and a chloride concentration of 350 mg/l to be maintained at Blind Point which is below the lowest agricultural diversion. In the absence of overland supplies to western Delta growers, water quality shall not be allowed to exceed these upper limits in the April 1 to August 1 growing season in all but critical years. Water quality from August 1 to December 1 would be held at or below 1,000 mg/l chlorides or an E-C of 3.6 millimhos at Blind Point in all years. The 350 mg/l Cl^- April 1 to August 1 standard is relaxed to 1,000 mg/l in critical years.

M & I standards call for a mean daily chloride level at or below 450 mg/l at Antioch for 150 days. This period is relaxed to 100 days in a critical water year. The fish and game *Neomysis* standard of 4,000 mg/l Cl^- at Chipps Island is year round with no relaxation in dry or critical water years.

The *Neomysis* standard is satisfied when the M & I and Agricultural standards are satisfied (see Fig. 17). In other words the outflows necessary to meet M & I and agriculture are more than adequate to meet the *Neomysis* standard. If, however, the M & I diversion is replaced by a substitute supply and irrigation of the western Delta is accomplished by an overland supply originating in the Delta, the M & I and agricultural standards would be relaxed to the point the *Neomysis* standard would require the highest, or controlling, outflow.

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[656] See Table IX following N. 110 *Supra* for a conversion of electrical conductivity to mg/l. Two millimhos is equal to 2000 micromhos or a class II water.

Outflows necessary to maintain the standards continue to be a topic of controversy. Table XX compares the State Board's estimated outflows with those estimated by other researchers. The author does not know the reason for the broad range between estimates. One can easily imagine the difficulty in calculating the various outflows necessary in such a changing system. Assumptions must be made for the tidal influence, quantity and quality of Delta inflow, in Delta use and return plus pumping rates. All are in a constant state of change - season to season, and, for some, day to day. Since it would be in the Board's interest to emphasize the minimum impact of the Decision, it probably utilized assumptions within the range of possibilities that would result in the most conservative values. Project operators, on the other hand, wishing to portray the maximum impact of the Decision, probably chose assumptions within the range of possibilities that would yield maximum outflow values. Whatever the case, Delta outflows to meet specific standards are difficult to predict and actual outflows probably fall within the range of values calculated by the two groups.

With the reservations for predicting outflows, as expressed above, clearly understood, Fig. 17 was developed to illustrate the interrelationships of the various standards in determining the control outflows. Outflow rates are plotted on the vertical axis while the year, by months, is extended along the horizontal axis. Beneficial uses, and abreviated forms of the associated standards, are plotted in the field for the period called for in D1379. Notice that

Table XX

Differences in Estimated Outflows Necessary to Maintain D1379 Standards in a Normal Water Year

Beneficial Use Duration and Approximate Period of Flow	State Water Resources Control Board Estimates[a]	DWR, BOR, Water Resources Engineer's Estimates[b]	Difference	
			Flow	Volume
Municipal & Industrial				
150 days, December through April	6,200 cfs	8,000 cfs	1,800 cfs	540,000 AF
Fish & Wildlife (B2)				
35 days in May	4,400 cfs	6,700 cfs	2,300 cfs	161,000 AF
Agriculture				
55 days, June through July	2,500 cfs	5,700 cfs	3,200 cfs	352,000 AF
125 days, August through November	1,800 cfs	4,200 cfs	2,400 cfs	600,000 AF
			Total	3,653,000 AF

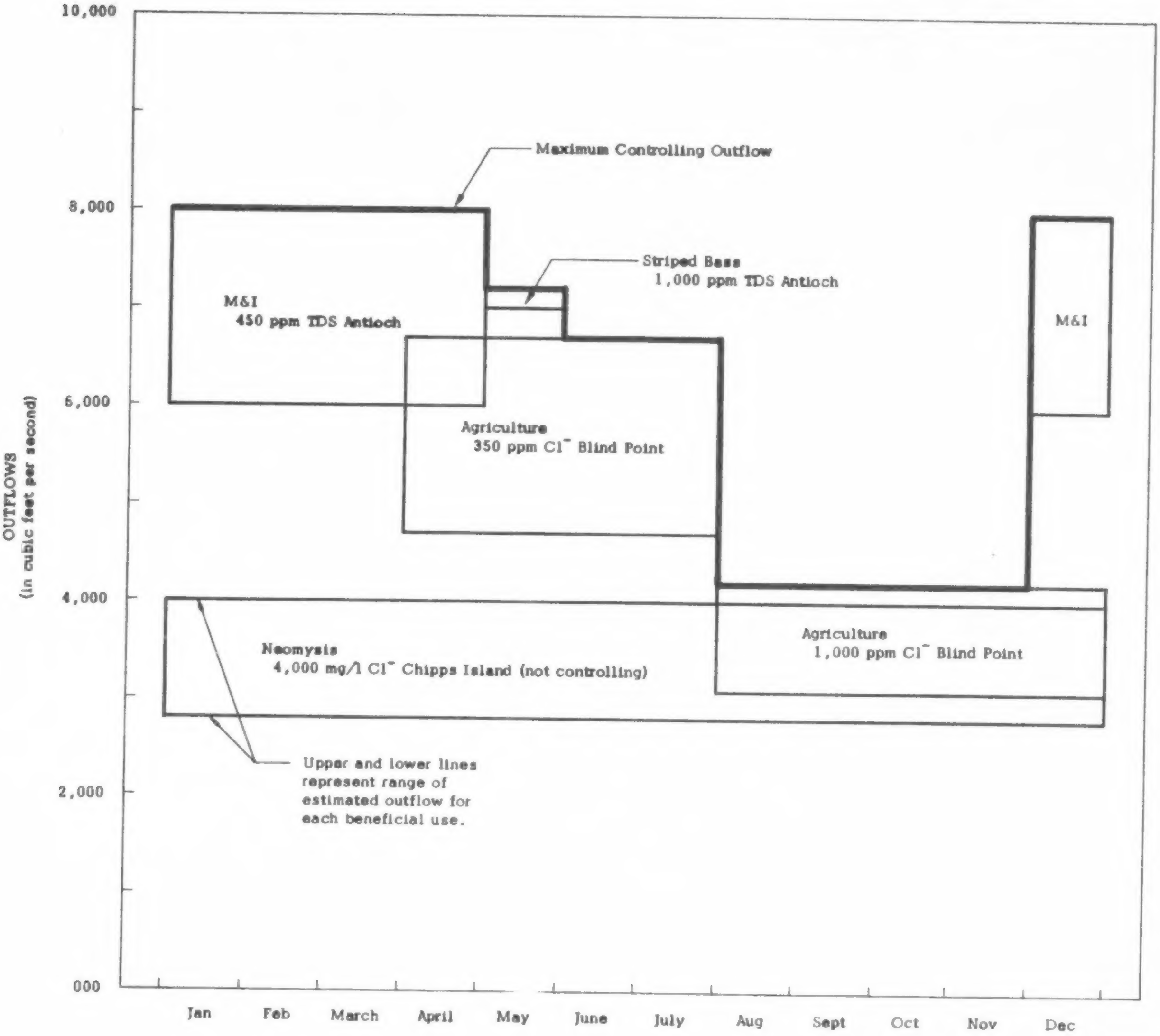
Sources:

[a] State Water Resources Control Board, D1379.

[b] Water Resources Engineers, Consulting Engineers for the Delta Water Agency, DWR, BOR, Working Papers of Technical Committee on Delta Outflow/Quality Relationships, January, 1972.

FIGURE 17

ESTIMATED RANGE OF OUTFLOWS REQUIRED TO MEET D1379 STANDARDS AT CONTROLLING STATIONS



The viewer should realize these estimated outflow figures are subject to debate. See Table XXII.

Source:
Water Resources Engineers, Consulting Engineers for the Delta Water Agency, DWR, BOR, Working Papers of Technical Committee on Delta Outflow/Quality Relationships, January, 1972.

an outflow range is given for each beneficial use as exact outflows cannot be predicted with certainty. As illustrated, M & I standards will control from December 1 to May 1, striped bass standards will control in May and agriculture for the remainder of the year. The top profile of this graph represents the maximum outflow.

It will be remembered that the 1,000 ppm Cl^- Blind Point August to November agricultural standards will be relaxed by moving the station from Blind Point to the Jersey Island and Emmaton stations when an overland supply is constructed. Since the 4000 mg/l Cl^- Chipps Island *Neomysis* standard will still have to be maintained, the agricultural relaxation afforded by an overland supply would salvage little or no water. Thus the *Neomysis* standard reduces or negates the emphasis for the overland supply.[657]

Reservations should be expressed in accepting the above observation for face value. They are: 1) with the present Delta system of exports and the need to protect export water quality outflows have ranged in the August-December period of the last four years from 5,200 cfs in August of 1973 to 63,900 cfs in December of the same year (see Table XIX), thus the standards are not controlling; 2) D1379 is an interim Decision and both the agricultural and Neomysis objectives may be altered--up or down - in the final decision; 3) D1379 has been stayed by court order as explained below.

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[657] In their Draft EIR on the Peripheral Canal, DWR proposed pp. 111-48 - 111-50) that D1379 would eventually be modified so that the *Neomysis* criteria would be relaxed to agricultural standards during dry or critical years. The document also assumed an overland supply would be constructed for the needs of the western Delta so that the controlling outflow would be 2,500 cfs to maintain a 1,000 ppm chloride at Emmaton in critical years. The fact that the State Board adopted the *Neomysis* standard as an objective in the Basin Plan, without relaxation (see objectives accompanying N. 633 *Supra*), indicates the Board may not relax the standard in the reconsideration of D1379. This observation coupled with the present status of the overland supply (see discussion accompanying N. 593 *Supra*) reduces the plausibility of DWR's assumptions.

Students of resource management may find the independence exhibited by the State Board in deriving D1379 as encouraging. As illustrated in Fig. 15, precedence for such a decision had not been established. The 350 ppm Cl^- Blind Point April-July standard was brought forward from D1275, and the 450 ppm TDS Antioch (M & I) (B5) and 1,000 ppm TDS Antioch (striped bass) (B2) standards had been developed by a federal task force under the direction of the Secretary of Interior. The agricultural standards were enhanced considerably over those in R. 68-17 and the Neomysis standard though not controlling is significant. Table XXI was developed to illustrate the impact of D1379 over R. 68-17 in normal and critical years. As stated previously, estimated outflows are not certain but the comparison may still indicate the magnitude of the impact on the projects.

The total impact of D1379 is difficult to fully ascertain. The value of the stored water necessary to maintain the standards has been set at $9.62 per acre-foot.[658] Thus the increased storage water requirement of 120,000 acre-feet with present development costs is $1.15 million. If the interim D1379 standards become permanent, then the increased storage water requirement (above

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[658] SWRCB, D1379, p.43.

TABLE XXI

COMPARISON OF R. 68-17 AND D 1379 DELTA STANDARDS

NORMAL YEAR

	Outflows		Storage Water Required, Acre-feet	
Standards	Use and Rate	Annual Amount	Present	1990 Level of Development
R. 68-17	1,800 cfs	1.3 MAF	100,000	n.g.[a]
D 1379	Municipal and industrial 150 days @ 6,200 cfs Fish and wildlife 35 days @ 4,400 cfs Agricultural 55 days @ 2,500 cfs 125 days @ 1,800 cfs	2.9 MAF	220,000	n.g.
Increases		1.6 MAF	120,000	500,000
	CRITICAL YEAR			
R. 68-17	213 days @ 1,800 cfs 152 days @ 900 cfs	1.0 MAF	n.g.	n.g.
D 1379	Municipal and industrial 100 days @ 6,200 cfs Fish and wildlife 35 days @ 4,400 cfs Agricultural 230 days @ 1,800 cfs	2.4 MAF	n.g.	n.g.
Increases		1.4 MAF	300,000	1.4 MAF

Source: State Water Resource Board, D 1379.

[a] Not given.

Other researchers estimate higher D1379 outflows. See Table XX.

R. 68-17) in 1990 will equal $4.8 million. In a critical year, with present development, the economic impact of D1379 above R. 68-17 would be $2.9 million and $13.5 million in a 1990 critical year.

As pointed out in a previous section, DWR has the authority to charge fish and wildlife enhancement to the State tideland oil and gas fund. However, a major portion of these funds is already allocated to storage reservoirs above Oroville; and this source may not be available.[659] Similar to this state authority, the 1946 Wildlife Coordination Act directs the Bureau to classify all project cost incurred for wildlife and fish enhancement as nonreimbursable.[660]

The question of reimbursement for agricultural outflows is not fully settled. To the extent that the growers receive, through D1379, a quality and quantity in excess of their vested right--they should pay. In ten years of negotiation, Delta growers and the project operators have failed to arrive at a mutually agreeable figure.[661] If DWR and BOR think there is room for compensation here, they should take the matter to the court. The reluctance of the two operators to do so has been attributed to the extensiveness of the adjudication that would result.[622]

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[659] See the discussion in N. 479, Supra.

[660] U.S. 79th Congress, Public Law 732 (62 Stat. 1080, August 14, 1946), cited in H.D. No. 246 (85:1), p. 415.

[661] See discussion accompanying N. 90, Supra.

[662] Robie, "The Delta Decision: Water Rights in a New Era."

In the opinion of this researcher, the project operators are not concerned with the cost of the increased outflows as much as with the availability of supplies. DWR calculates that the project deliveries will be met in normal years and 2020 development, but a "critical dry period" with this level of development would require an additional 1.4 MAF of storage per year.[663] DWR states:

> The recurrence interval of a six-year drought comparable in severity to the 1929-34 critical dry period is not known. Estimates range between 100 and 400 years, and the best estimate at this time is that a similar drought could be expected about once every 200 years on the average. It could occur twice in successive decades, however.[664]

The document also states such a period has not recurred in the 120 years of record and other researchers set the period of recurrence at 400 years.[665] Thus, the position taken by DWR, that it needs more reservoir storage, may be overstated. Nevertheless, D1379 will put additional pressure on existing project supplies and undermine the agencies' raison d'etre--purveying water.

Reaction to Decision 1379

Response to the Delta standards has been somewhat predictable. Environmentalists immediately labeled them the Magna Carta of the Delta. Customers of the projects successfully filed a temporary injunction against the implementation of the standards.[666] The Bureau has stated it cannot meet the D1379 standards because to do so would be contrary to the existing congressional authorization for the CVP.[667]

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[663] DWR, Draft EIR: Peripheral Canal, p. III-61. See also text accompanying N. 552 Supra.

[664] DWR, The California Water Plan: Outlook in 1974, Summary Report Bull. No. 160-74, November 1974, p. 17.

[665] Sacramento Area Consultants, Sacramento Regional Wastewater Management Program: Outfall: Project Report and Draft Environmental Impact Report, January, 1975, p. 111-15.

In the Legislative arena, Assemblyman Badham (Orange County) introduced Assembly Bill No. 2212 to codify (California Water Code) Decision 1379, thereby removing the legal barrier of the unsettled injunction.[668] With codification, the Assemblyman believes a more amiable climate to start construction of the Peripheral Canal will exist.[669] The bill suffered a natural death with the termination of the session (1972). AB 837 introduced in the 1973 session with the same objective met the same fate. Assemblyman Ken MacDonald, Chairman of the Assembly Committee on Water, introduced a bill in 1974 which would have reduced the powers of the State Water Resources Control Board. AB 3070 specified the Board could not require the release of storage water for maintaining downstream water quality conditions that would not exist in the absence of the project.[670] In other words, reservoir releases would not have to be greater than reservoir inflow in the lowflow summer period. The bill met defeat.

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[666] The Sacramento Bee, October 13, 1971, p. A12.

[667] Billy E. Martin Regional Director, BOR before the California Legislature. Senate Committee on Natural Resources and Wildlife Hearings on Draft EIR: Peripheral Canal, December 1?, 1974.

[668] California Legislature. Assembly. Assemblyman Badham and Senator Carpenter, Assembly Bill No. 2212, introduced on March 15, 1972, amended June 12, 1972.

[669] Assemblyman Badham, in Hearings before the California Assembly. Committee on Water, November 9, 1972.

D1379 has triggered litigation that has been building since the Antioch Case in 1920.[671] Three months after D1379 was issued two lawsuits seeking an order to set aside the decision were filed in the Superior Court of Sacramento - Central Valley East Side Project Association v. State Water Resources Control Board and Kern County Water Agency v. State Water Resources Control Board. The respective parties request that Decision 1379 be set aside because:

(1) it requires the Department and the Bureau of Reclamation to release water from storage and to curtail direct diversions to prevent Delta channel salinities from exceeding the enumerated standards which are higher than would have been present in the absence of the state and federal projects;

(2) these requirements are imposed without requiring payment for the benefits;

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[670] California Legislature. Assembly. Assemblyman MacDonald, Assembly Bill No. 3070, introduced on February 11, 1974. See also Oakland Tribune, April 1, 1974, p. 12F.

[671] See discussion accompanying Ns. 130-131 Supra. In the opinion of this writer the Antioch decision was a physical decision-solution more so than a legal solution that would carry through to the present time. The question of the upstream diverters obligation to the downstream senior diverter is still very much alive. See discussion accompanying Ns. 661, 662, Supra.

(3) the requirements will seriously reduce the quantity and dependability of water which may be delivered to customers of both projects; and

(4) the requirements will increase the cost of water to state and federal customers due to additional facilities which will be necessary to replace the water required to be released.[672]

The cases were consolidated and on January 14, 1972 the Superior Court issued a stay of D1379. It remains in effect at the completion of this thesis in May 1975.[673] An intervene, the Contra Costa Water Agency filed a cross-complaint against the Bureau of Reclamation and DWR asking the court to determine that the Bureau is subject to the jurisdiction of the State Water Resources Control Board and that salinity control is a nonreimbursable function of both the CVP and SWP.[674] Similarly, the State Water Resources Control Board, through the California Attorney General's Office, intervened as a cross-complainant against the United States asking the court to determine that the Bureau is subject to the jurisdiction of the Board.[675] The case has been transferred to the Federal

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[672] DWR, Bull. No. 132-72, p. 17.

[673] W. W. Adams, Chairman, State Water Resources Control Board, Testimony before the California Legislature. Senate. Senate Committee on Natural Resources and Wildlife, December 11, 1974.

[674] DWR, Bull. No. 132-73, p. 11.

[675] DWR, Bull. No. 132-74, p. 10.

District Court in Sacramento. Action on the case has been suspended until the federal court decides the case of United States v. California which is described below.[676]

Sec. 8 v. California Water Code

The United States v. California case will decide the age old question of federal sovereign immunity v. the orderly distribution of a state's waters through the issuance of water rights. Section 8 of the 1902 Federal Reclamation Law requires the Bureau to adhere to the water rights of the state in which they are operating. The Bureau takes the position they will conform to California's water rights as required by Sec. 8, to the extent this conformance will not interfere with the operation of the CVP as authorized by Congress.[677] This highly complex and technical legal question has been fermenting in California for several years, but the legal resolution has been postponed by the physical solution of building more reservoirs and creating a sufficient supply of water to satisfy all beneficial uses.[678] As the reservoir sites become scarce, project service area water demands increase and environmental considerations become ascertive, the finite supply is inadequate and a legal resolution becomes necessary. Such a time has arrived. D1379 was the first of three decisions issued by the State Water Resources Control Board that prompted the Bureau to bring the matter to court in the United States v. California case.

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[676] W. W. Adams, Testimony before Ca. Senate Committee on Natural Resources and Wildlife, December 11, 1974.

[677] State Water Resources Control Board, New Melones Decision, Decision 1422, April 1973, p. 25. According to one water rights scholar the Bureau has not fully complied with Sec. 8 except for a brief initial period. S. T. Harding, "Federal and State Policies with Respect to Control of Water" in Legal Problems in Water Resources published from a Conference on Legal Problems in Water Recources by U.C. Berkeley Committee on Research In Water Resources, 1957, p. 79.

[678] It was early realized that this problem existed in regards to the application of Ca. Water Code Secs. 11460-11463. See

D1400 and D1422

Following D1379 the State Board issued D1400, the Lower American River Water Rights Decision which will impact upon the CVP Auburn Reservoir, under construction at the writing of this thesis. Prior to D1400 the Bureau had agreed with the California Department of Fish and Game to maintain a flow of 250 cfs from January 1 to September 14, and 500 cfs for the balance of the year in the 23 mile stretch of the American River from Nimbus Dam to the Sacramento River.[679] Noting that the Department of Fish and Game had determined minimum flows of 1,250 cfs from October 15 to July 14 of the succeeding year and of 800 cfs from July 15 to October 14 would be necessary to maintain the fishery resources in the stream at pre-project levels, D1400 incorporated these higher figures.[680] In addition, the State Board recognized Sacramento

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discussions in and accompanying N. 577 Supra. One approach has been to write these sections into the authorizing legislation as was done for the New Melones Project. N. 695 Infra.

[679] State Water Resources Control Board, Decision 1400, Lower American River Water Rights Decision, April 1972, p. 8.

[680] Ibid., pp. 10, 20.

County's $30 million American River Parkway program and the large recreation demand placed on the Lower American.[681] Thus the minimum fishery resources' flows were increased to 1500 cfs from May 15 to October 14 for recreation. The Decision provides for a relaxation of the fishery flows and a suspension of the recreation flows in periods of project deficiencies.[682]

The impact of this decision upon the present American River facilities is minimal. The Bureau will be able to satisfy the requirements of D1400 and meet all its planned commitments in the Folsom South Canal Service area via the Folsom South Canal which diverts from the American River.[683] However, the Folsom South Canal is scheduled to be the first reach of the yet to be authorized East Side Canal and water used to meet the Lower American River minimum flow requirements cannot be diverted directly into the East Side Canal.[684] Thus, D1400 has the potential of seriously affecting the operation of the planned East Side Canal. It should be mentioned that the Bureau also plans to supply this canal with diversions from the Sacramento River via the Hood-Clay pump lift canal, a proposed segment of the East Side Canal.[685] The State Board contends that the most beneficial use doctrine dictates that the Hood-Clay facility be sized to pick up the reservoir releases to the Lower American River to maintain the minimum flows. That is, rather than diverting this water directly into the Folsom-South Canal above the highly used lower stretch of the American River, the water should flow down the river, join the Sacramento River water and then be diverted to the East Side Canal via the Hood-Clay facility.[686] All the beneficial uses would then be satisfied at the cost of pumplifting the Lower American minimum flows back up to the East Side Canal.

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[681] Ibid., pp. 11, 21, 23.

[682] Ibid., p. 23.

[683] Ibid., p. 21.

[684] For a description and status report of this facility of the CVP see the text accompanying and discussed in N. 252, Supra.

[685] BOR, East Side Division, Initial Phase: Feasibility Report, June 1966, p. 55. See also discussion accompanying N. 252, Supra.

Under the provisions of the Folsom Formula described elsewhere, the U.S. Army Corps of Engineers is constructing the New Melones Dam that the Bureau will operate as a segment of the CVP.[687] After the Corps had invested some $30 million in on-site construction on the New Melones Dam the Bureau's application for a water right to store and divert water with the facility got underway.[688]

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[686] SWRCB, D1400, pp. 12, 20. Two court cases now in progress somewhat support this approach. Sacramento County is suing the East Bay Municipal Utility District, (N. 223 Supra) a planned recipient of CVP water via the Folsom South Canal, to divert its American River Water downstream from Sacramento. The Environmental Defense Fund is suing the district to reclaim wastewater rather than divert the American River water. California Attorney General Evelle J. Younger filed a rare friend-of-the-court brief in support of Environmental Defense Fund case which in actuality also supports the county's case. Oakland Tribune, January 11, 1974, p. 2. The reader should not confuse these two cases with the Natural Resources Defense Council v. Stamm. This suit claimed the Bureau's Environmental Impact Statement for the Auburn Dam-Folsom Project is inadequate. The Bureau was instructed by the court to prepare an adequate document within five months or construction would be halted. The Bureau complied and the project is moving ahead. It should be noted here that the plaintiff filed an amended complaint on November 12, 1973 seeking to force the Bureau to comply with D1400. DWR, Bull. No. 132-74, p. 10. This case has become inactive as this question is being decided in U.S. v. California discussed below.

[687] See discussion in N. 277 Supra.

The State Water Resources Control Board's New Melones Project Water Rights Decision, D1422, is probably more unfavorable to the Bureau than either D1379 or D1400. Two basic issues were under consideration in this application. Similar to D1379 and D1400 downstream water quality maintenance was a major issue. In addition, the need for the water the project would develop was in question.

Water quality maintenance in the lower Stanislaus is a serious problem but even more serious is the water quality maintenance in the lower San Joaquin River. The Stanislaus River contributes about 25 per cent of the annual flow of the San Joaquin River and 15 per cent of the critical July - October flow. Most of the lower San Joaquin River summer flow consists of irrigation return water and the Stanislaus River outflows dilute the saline content in the lower San Joaquin to a useable level.[689]

The Bureau obligated a maximum of 70,000 AFA (Acre Feet/ Anum) from the project to the maintenance of an upper limit of 500 ppm Total Dissolved Solids (TDS) and a dissolved oxygen (DO) level at or above 5 ppm in the lower San Joaquin.[690] Evidence presented at the hearings indicates this level quality may not protect the beneficial uses in the lower San Joaquin River, so the Board reserved jurisdiction on the quality level that should be maintained.[691] In the interim, the Board adopted the water quality standards in the Interim Water Quality Control Plan for the Central Valley Region. The TDS value is the same (500 ppm) but the DO level of 85 per cent of saturation is more restrictive.[692] Also, the Board concluded, the annual maximum of 70,000 AFA may not, in the future, provide the interim TDS and DO level so that the Board reserved jursidiction over the outflows necessary to maintain the downstream water quality levels.[693]

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[688] San Francisco Examiner, September 29, 1972, p. 4.

[689] State Water Resources Control Board, D1422, p. 11.

[690] Ibid., p. 11.

The most provocative issue considered and ruled upon in the decision is the question raised over the Bureau's need for the water that would be stored behind the reservoir. Two major service areas for New Melones water were identified by the Bureau; the local service area which consists of the four counties in the Stanislaus River Basin, and all other CVP service areas south of the Delta.[694]

Under the requirements of Secs. 10505 and 11460 of the California Water Code, the four counties have first call on the water in the basin. This reservation was also incorporated in the congressional authorization.[695] The State Board concluded the four counties could at some unknown future time utilize the water, but a reasonably present need was not demonstrated.[696]

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[691] Ibid., p. 31.

[692] Ibid., pp. 31, 13, 12.

[693] Ibid., pp. 13, 20, 21, 31, 32.

[694] Ibid., p. 13.

In regards to the general CVP service area south of the Delta, the Bureau was able to demonstrate a need for water but, "...the record shows that the CVP has substantial quantities of water that are not being used and are not under contract. The Bureau's own records indicate that without the yield of the New Melones Reservoir the Bureau can meet the estimated buildup of demands under present contract for a long period of time."[697]

The State Board, therefore, concluded:

> The limited unappropriated water resource of the State should not be committed to an applicant in the absence of a showing of his actual need for the water within a reasonable time in the future. When the evidence indicates, as it does here, that an applicant already has a right to sufficient water to meet his needs for beneficial use within the forseeable future, rights to additional water should be withheld and that water should be reserved for other beneficial uses.[698]

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[695] These sections are reproduced in the text accompanying N. 589 Supra. This note also points out there has long been some question of the applicability of these sections to the CVP. According to Reclamation Law (Sec. 8) the Bureau has to honor state water law but a conflict arises when this law restricts the operation of the project from that authorized by Congress. It is important to realize the approach utilized in the New Melones; the controversial California Water Code sections were written into the Congressional authorization.

[696] SWRCB, D1422, pp. 16, 17, 27.

[697] Ibid., p. 14.

[698] Ibid., p. 16.

Since the identified beneficial uses of downstream water quality maintenance, recreation and wildlife preservation and enhancement could be met with 1.42 MAF of storage, the Bureau was ordered not to fill the 2.4 MAF facility beyond the 1.42 MAF figure.[699] When the Bureau can demonstrate a real need for the remainder of the project's potential yield, the State Board will reopen the hearings to reconsider this issue. Because of the many unsettled aspects of the decision the Board committed itself to a rehearing of the decision by July 1, 1986.[700]

Because of the Board's reservations on the level of downstream water quality to be maintained and the outflows necessary to maintain this quality, the Bureau will never be certain of the project's supply for distribution. There is little doubt that in the future the Bureau will be able to show a need for, and receive a permit to collect and store, the full yield of the project. Planning for the distribution of these yields will forever be hampered by these reservations and the potential of a series of such reservations upon future projects would undermine the planning and operation of the CVP. Thus, the Bureau initiated the legal action described in the next section.

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[699] Ibid., p. 29.

[670] Ibid., p. 31.

Post New Melones

Taken together, D1379, D1400 and D1422 would have substantial impact on the present and future operation of the CVP. Thus it came as no surprise when the Bureau, acting through the Justice Department, officially declared the U.S. government, "...cannot be made subject to any terms imposed by a state agency which would interfere with any federal projects authorized by Congress."[701] The position was declared in a telegram delivered to U.S. District Court Judge Charles Renfrew in a suit to block construction of the New Melones Dam on the Stanislaus River.[702]

The California Attorney General filed suit against the Bureau in People ex rd. v. Rogers C. B. Morton and Gilbert Stamm. The complaint asked the court to declare that:

> ...the Bureau of Reclamation must comply with the provisions of Decision 1379 with regard to the Delta, Decision 1400 with regard to the American River, Decision 1407 with regard to Hidden Reservoir on

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[701] San Francisco Examiner, October 7, 1972, p. 6. Oakland Tribune, October 15, 1972, p. 8.

[702] The Environmental Defense Fund filed suit against the U.S. Army Corps of Engineers on the grounds the Environmental Impact Report on the project is inadequate. The District Court and the Appeals Court ruled in favor of the project though the Appeals Court did impose, for a while, an injunction against construction. The Sacramento Bee, November 19, 1974, p. B2. In April and again in November, 1974 the U.S. Supreme Court refused to consider the case. The Sacramento Bee, November 26, 1974, p. A4. On November 5, 1974 the voters of the state rejected proposition 17, 2,783,264 to 2,478,004 thereby endorsing the New Melones Reservoir. The Sacramento Bee, November 6, 1974, p. A4. U.S. Senators from California, Cranston and Tunney tried unsuccessfully to halt the Senate Public Works Appropriation Subcommittee from giving the project more money in the appropriation bill. "Water Resources Report" in California Builder & Engineer, Vol. 80, No. 18, September 27, 1974, p. 34.

> the Fresno River, and Decision 1422 with regard to New Melones Reservoir on the Stanislaus River. The suit asks for a declaratory judgment that the Bureau must apply to the Board for permits if it wishes to acquire water rights for the federal Central Valley Project; that the Board is authorized to impose reasonable conditions on such permits; and that the Bureau is required to comply with reasonable terms and conditions in permits.[703]

The United States responded with a denial and a claim of sovereign immunity. It further countered with a suit against the State Water Resources Control Board—United States v. State of California claiming the Bureau's water rights are not subject to the Board's regulations.[704] The first set of arguments were presented in November, 1973, and one source states the adjudication resolution may take up to 15 years.[705] As discussed in the concluding chapter the outcome of the above case will have a significant impact upon the litigation over D1379. Given the slow pace in which the courts act, it can be concluded that it will be some time before the Delta water quality controversy is decided. It should be remembered D1379 was an interim decision to be reconsidered by mid-1978.[706] Effective reconsideration can only be accomplished after the courts define the roles of the various agencies in the controversy and the courts further rule on the D1379 case. Thus, the lawyers will occupy many years in casting the last word in this problem that was recognized and planned for hand-in-hand with the development of the two projects.

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[703] DWR, Bull. No. 132-74, p. 10.

[704] Ibid., p. 10.

[705] California Legislature Senate Committee on Natural Resources and Wildlife, The Peripheral Canal Project: A Report to the Legislature, January, 1965, p. 9.

[706] Supra N. 655.

Subsequent to the finalization of this thesis, Judge Thomas McBride of the United States District Court for the Eastern District of California handed down a strong opinion in favor of U.S. on October 9, 1975. On November 20 the State Water Resources Control Board unanimously moved to appeal the ruling. Judge McBride's judgement reads:

> (1) The United States can appropriate unappropriated water necessary for use in any federal reclamation project within the State of California, but must first, in accordance with comity, apply to the California State Water Resources Control Board for a determination by that Board of the availability of unappropriated water;
> (2) When the United States submits applications to the California State Water Resources Control Board, that Board must grant such applications if unappropriated waters are available.
> (3) Nothing contained in Section 8 of the 1902 Act or in any other presently existing federal law, regulation or administrative directive allows the California State Water Resources Control Board to impose any terms or conditions in permits issued to the United States as a result of applications to the Board by the United States for allocations of unappropriated water;
> (4) Decision 1422 is void in all respects where it attempts to impose terms and conditions of any kind upon the acquisition by the federal government of unappropriated waters as said terms and conditions may relate to the control, development or operation by the federal government of the New Melones Project.
>
> California's motion for summary judgment is DENIED and summary judgment is GRANTED for the United States in accordance with the views expressed in this opinion.
>
> IT IS SO ORDERED.
>
> DATED: October 9, 1975.

CHAPTER IX

OVERVIEW : OBSERVATIONS : OUTLOOK

October 14, 1974

Editor of the Sacramento Bee--Sir: An editorial in The Bee Sept. 15 said: "Peripheral Canal would Be Beneficial To all." No doubt it will benefit the new orchards and ranches along the Westside Canal, and all of Southern California with its insatiable greed for more water.

It would be of absolutely no benefit to anybody or any community in Superior California. We cannot get our fair share now. The Tehama-Colusa Canal has been on the books for decades, yet it is not even half completed. Butte County has an allotment of only 27,500 acre-feet from the Feather River. Paradise has a lar increase in our miniscule allotment from the Feather River--our eastern boundary.

The canal would not stop any of the levee erosion. The canal would not assure Oakland, San Francisco and the bay communities any reserve supply of fresh water, and would not positively guarantee fresh water at the present pumping plant.

The Peripheral Canal should not be built. Instead there should be constructed a dam across Carquinez Straits to create a tremendous fresh water reservoir reaching to Sacramento and Stockton. Then there would be pure, fresh water for all. There would be no salt water tides and that would decrease levee erosion. Steamships would not have to buck strong currents and tides. Boating and swimming would be more enjoyable.

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INTRODUCTION

Of the many observations made in the preparation of this thesis, the most recurring is the amount of emotionalism and bias that exist in water resource literature--by all involved. The gentleman who wrote the above should be commended for taking an active role in his civic duties, but except for a very few points, he has not assumed the responsibility of being objective. His mission of informing others was overwhelmed and misguided by emotionalism before he put pen to paper.

This thesis has, by its investigative nature, uncovered what the writer judges as mismanagement of the water resources of the state and a less than honest role by many federal and state officials. As stated in Chapter I, and again here, the writer has endeavored, in general, to withhold judgement and analysis while presenting the controversy in Chapters II-VIII. Some judgement is interjected for emphasis and due to the complexity of several subjects, some opinion has been incorporated in the analysis of these topics. However, to hold all opinion for the final chapter was found to be impractical.

Nevertheless, the overriding goal has been to establish, as complete as possible and as objective as possible, the record of the salinity control controversy so that subsequent readers will be able to understand the controversy and judge for themselves. This chapter will present an overview of the major topics considered in this study and will summarize and present opinions based upon both the data available to and the opinions of this researcher. Both opinion and fact are utilized to present the conclusions contained herein.

The final section, Outlook, contains a matrix of the most probable future scenarios with their concomitant impact on Delta water quality, ecology and export project water quality and quantity. Utilizing the three alternatives for the Peripheral Canal (state only, state and federal, no project), the two alternatives in the D1379 court case, the two alternatives in U.S. vs California and three alternatives of the Delta Water Quality Objectives (objective not ruling, ruling on state only, ruling on both federal and state), 36 future alternatives are identified. Since some of these have the same impact on Project and Delta water quantity and quality they are combined for ease of discussion and presentation.

OVERVIEW

In the summer of 1917 an increase in Sacramento River diversions for expanding rice production in the Sacramento Valley, coupled with dry hydrological conditions, resulted in a reduction of Sacramento River discharge so that the saline bay waters migrated into the Delta, menacing agriculture for the first time. Partial relief occurred in 1934 with a return to average and above average hydrological conditions and the low summer outflows were further enforced with the construction of Shasta Reservoir in 1944. Presently, large

Delta outflows maintain a high degree of salinity control.

Salinity control has played a dynamic role in the development of the Federal Bureau of Reclamation (BOR) Central Valley Project (CVP) and the State Department of Water Resources (DWR), State Water Project (SWP). Cast in the present light of competing demands for the developed water supply, salinity control, or the contemporary title of Delta water quality maintenance, is viewed by the project's policy makers as an expensive project function that should be minimized; water allocated to this purpose flows into the Pacific Ocean via San Francisco, thus it cannot be exported.

The information presented in this thesis indicates rather strongly that this current position of the policy makers is antipodal to that taken by their predecessors during the formulation of the projects. In the early planning for the Central Valley Project, and to some extent the State Water Project, salinity control was promised as a major function of the projects. The courts are now resolving this 58 year old conflict.

The complex controversy has remained unresolved for two reasons: 1) up to the present, there has been sufficient water to meet the requirements of the projects and maintain salinity control; and 2) with the present system of Delta exports, Delta water quality maintenance is necessary to maintain export water quality. The projects cannot export water of an acceptable quality if the quality in the Delta, the point of diversion, is not maintained.

Reservoir sites are not ubiquitous resources and those remaining will cost much more per acre foot of water yield than those existing; therefore, the competition for the presently developed water supply has intensified. Also, the planners for the two projects have proposed a Delta transfer project, known as the Peripheral Canal, which would render export project water quality independent of Delta water quality. As this project moves closer to fruition, the question of Delta water quality takes on added emphasis; large reservoir releases into the Delta may have a negative impact upon the future physical and economic aspects of the projects; minuscule Delta inflows will result in a degradation of Delta water quality with concomitant negative impacts upon the industrial, municipal and agricultural diverters in the Delta plus the Delta ecological systems as they now exist.

OBSERVATIONS

Perception and Planning for the Delta

A correct interpretation of an area is a basic necessity in developing any type of plan or project that will have an impact upon the area. Obviously, this interpretation should extend over the life of the anticipated influence or impact. It appears to this reader that the misconception of the Delta by Governor McDougal in 1852 has continued to persist.[707] For example, oxidation of the Delta peat soils will continue at the rate of about two-three inches a year until the organic soils are removed.[708] In a few cases, such as the interior islands, the land will be up to 40 feet below sea level. The concomitant buildup of the hydrostatic head between the Delta channels and the lower interior islands will be greatly enhanced and the already weak levees will have to be reinforced considerably. A previous discussion has pointed out that while the upstream reservoirs have reduced some flood flows, the unregulated flows plus a combination of winds, rains and tides will continue to cause levee failure.[709] The oxidation may eventually reduce the islands interiors so that the islands cannot be economically protected and will therefore have to be abandoned. DWR and BOR acknowledge the levee failure rate may increase, but the agencies have not taken this consideration into their planning. Instead, the future Delta landscape is interpreted as it exists today and DWR has actively supported legislation that would aid the levee maintenance districts.[710]

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[707] See quotes in text accompanying Ns. 57 and 64 Supra.

A viable alternative to such appears to be the condemnation of some islands and allowing them to revert to marsh land. However, such an action may create more problems that it would solve. Flooding an island would increase the tidal prism in the Delta which would require additional outflows to maintain the same water quality.[711] Since this thesis has not investigated the ecological considerations in the Delta water quality controversy, the writer is not familiar with the ecological impact of such an action. However, the question arises as to why the State Board in D1379 or DWR and BOR in their EIR and project reports have not considered such an alternative?[712]

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[708] See text accompanying N. 74 Supra.

[709] DWR, Delta Water Facilities, Bulletin No. 76, Appendix Economic Aspects: December, 1961. Plate 13, "Areas of Peat and Related Organic Sediments." This plate illustrates several islands that are now 20 feet below sea level, as having over 20 feet of peat remaining. See also text between Ns. 91-93.

[710] See text accompanying N. 109 Supra.

Since island flooding would increase the tidal prism and require larger reservoir releases to protect Delta export water quality, it is understandable why the two export agencies have not advocated such an alternative. However, given the Peripheral Canal and both projects utilizing the facility, Delta water quality maintenance would be independent of export water quality.[713] Thus, DWR and BOR would be receptive to the idea of island flooding if it was accompanied with a reduction in western Delta water quality objectives that could be maintained with smaller Delta outflows. The points to be made here are:

- The planners do not deal with the potential changing landscape in the Delta.

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[711] DWR, Salinity Control Barrier Investigation, Bulletin No. 60, March, 1957, p. 25. In the studies that led to this report DWR discovered that reclaiming Franks Tract would reduce this area under tidal influence and result in a substantial saving of outflows, p. 27.

[712] The State Board in D1379 (p. 34) did state the Department of Fish and Game should investigate the idea.

[713] See discussion between Ns. 545-552 Supra.

- With the present system of Delta exports the quality of the project's Delta export water is as vulnerable as the vulnerability of the Delta levees, which is increasing.

- By maintaining their levees, Delta agriculturalists are assisting the projects in Delta water quality maintenance.

- The Projects' operators and service areas will continue to support state and federal levee maintenance aid as long as the projects export water from the Delta as they do now.

- Once the Peripheral Canal is in operation, this levee maintenance support may not persist.

- The State Water Resources Control Board should address the issue of future water quality with levee failures or at least stipulate in the final Delta decision that water quality standards may be altered at some stations should an island or islands be reverted back to a flooded state.

Salinity Incursion in Historic and Post Projects Period

Identifying the historical salinity incursion is an important first step in determining the natural ecological system, Delta water rights, and the effect of the projects on altering the incursion. A discussion of the incursion is summarized in this section under three headings: Pre 1920; 1920-1944; Post Shasta Reservoir. The author takes issue with the following passages from DWR's Draft EIR: Peripheral Canal:

> In its natural environment, about 125 years ago... It [the Delta] was subject to intermittent intrusion of ocean salts during the dry summer months of lean water years...
>
> . . .
>
> Very large winter inflows sometimes push the saline water as far back as San Francisco Bay. Historical summer inflows have been small enough during extreme dry periods to allow the tides to carry saline water nearly as far upstream as Sacramento and Stockton.
>
> . . .

> Before 1920, they [Delta growers] were able to divert useable water in all but a few summer months of the driest years. But, as the diversions from the Delta and from streams tributary to the Delta increased, the outflow remaining available to repulse salinity has decreased, particularly in late summer.
>
> . . .
>
> Prior to operation of the SWP and CVP projects, the western Delta was intruded by salt water in varying degrees every year during the late summer.
>
> . . .
>
> This area [western Delta], prior to the operation of the Central Valley and State Water Projects, was subject to saltwater intrusion each irrigation season varying in degree depending on the duration of the spring runoff season.[714]

These statements indicate that prior to 1920 saline waters migrated into the western Delta in the late summer of dry water years; after 1920 extreme dry periods were accompanied by incursions almost to Sacramento and Stockton; and the two projects have maintained an outflow adequate to hold back the incursion.

Pre 1920 Incursion

Historical accounts of the salinity incursion are sketchy or absent. The Spanish expedition in the San Carlos in 1775 probably encountered fresh water before it reached the Delta but Commander Ringgold in 1841 did sail three miles into the Delta before he found fresh water.[715] Two points should be kept in mind; first,

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[714] DWR, Draft EIR: Peripheral Canal, pp. II-6, II-21, II-21, IV-197, V-43.

[715] See text accompanying N. 116 Supra.

Commander Ringgold clearly recorded that 1841 was a very dry year and second, water that may taste brackish is still class one agricultural water.[716]

In 1860 Antioch was settled and its residents began to divert their water supply from Mallard Slough offshore. In the 1920 Antioch Case some of the longtime residents testified the water was too brackish for domestic consumption during summer months of dry years,[717] but others testified the water was suitable for irrigation at all times.[718] Other convincing evidence exists that the salinity incursion - to the extent it menaced agriculture - did not occur until 1917. Col. Alexander's Survey of 1874,[719] studies published by the Commissioner of Public Works from 1893 to 1907,[720] the Debris Commissioner beginning in 1893,[721] and Elwood Mead's reports of 1901 and 1902[722] did not recognize salinity incursion as a problem. Probably the most illustrative evidence that the salinity incursion did not exist was the 1913 report issued by the Conservation Commission to the Governor and the Legislature. Two years in the making, water commanded 373 of the 502 page report and the potential salinity incursion problem was dismissed with the statement, . . . "They [San Joaquin Delta lands] are more affected by an oversupply of water [floods] than by a scarcity and no development on the tributary rivers will ever be so complete but that waste and return flow will be sufficient for these lower areas."[723] Starting in 1913 the State Water Commission began to publish biennial reports and in October, 1916, the salinity incursion potential was first noted.[724] Since the potential problem was not identified until 1916, it may be assumed that the incursion did not, in fact, occur until 1916.

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[716] See quote accompanying N. 116 Supra. for Commander Ringgolds' statement. The U.S. Public Health Service recommends a drinking water upper chloride content of 250 ppm but purveyors prefer a quality of less than 100 ppm. Supra N. 288. Class I irrigation water ranges up to 700 mg/l total salts. See Table IX.

[717] See text accompanying N. 118 Supra.

[718] See text accompanying N. 119 Supra.

[719] See text between Ns. 139-141 Supra.

[720] See discussion in N. 149 Supra.

[721] See discussion in N. 152 Supra.

[722] See discussion in text between Ns. 153-157 Supra.

1920-1944 Incursion

The DWR quotes published at the beginning of this section indicate that the incursions occurred unabated until Shasta Reservoir went on line in 1944. Information presented in Chapter II points out the greatest incursions occurred in the 1920s during a prolonged dry period and once the hydrological conditions returned to normal, the discharge was increased and the annual incursion was greatly reduced. In an average water year, 1936, the Delta crop loss attributable to the salinity incursion was .02 per cent of the total Delta crop value. And from 1924 to 1942, including the driest cycle on record the annual loss averaged only .82 per cent of the annual crop value.[725]

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[723] See quote accompanying N. 160 Supra.

[724] See text accompanying N. 162 Supra.

The discussion accompanying Ns. 134-136 (Supra) of this thesis indicate that the upstream diversions, during this pre-project period, reached a maximum without a guaranteed high flow in the summer, that could only be provided by stream regulation. In other words, it appears, the Sacramento Valley had reached its irrigation carry capacity. The expansion of irrigated agriculture had reached a point of equilibrium with the available water supply of the Sacramento River. Substantial expansion was held in check by the critical summer low flows. Table XII indicates the natural flow plus the agricultural return waters were sufficient for Delta agriculture with incursions of minor economic consequence.

Post Shasta Reservoir Incursion

There is no doubt that the present Delta outflow is greater than the natural Delta outflow in the summer low flow period, especially in below normal hydrological years. The extent to which the Delta growers benefit from this increased outflow is discussed in a subsequent section. However it should be pointed out that due to the fact Shasta Reservoir is firming up the water supply in July, August and September, Sacramento diversions have increased to the point in some years that all of the natural flow plus part of the augmented flow is diverted. Within seven years after Shasta Dam was completed, consumptive use of the Sacramento River water in the Sacramento Valley increased two-fold.[726] With a guaranteed supply, the Sacramento Valley growers expanded to divert all the natural flow plus some of the releases from Shasta Reservoir. By 1951, the diversions increased to the point the Bureau did not have enough water to meet its projected demands. The Bureau started to organize for a legal adjudication of the river to recover its water or receive compensation for that water above the natural flows that were being diverted.[727] Congressman Clair Engle from Red Bluff prevented this "Legal Frankenstein", as it was referred to, by introducing and guiding through Congress the Trinity River Project authorization thereby importing Trinity River water into the Sacramento system.[728]

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[725] See Table XII Supra. Also see Table XXII Infra for the estimated inflow to Shasta Dam for the past 125 years.

It is therefore deducted from this information that while the reservoirs maintain a greater Delta outflow than the historic summer outflows, especially in dry years, they have also indirectly reduced the natural outflow. The historical record indicates that before Shasta Reservoir, the Sacramento system had reached a state of equilibrium. Irrigation expansion was held in check by the low summer flows, especially in dry years. Shasta Reservoir guaranteed a supply in the low flow period and the irrigation expansion increased to divert all the natural flow plus some reservoir releases. Thus, a feeling has been generated that the following statement in DWR's Peripheral

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[726] See text accompanying N. 284 Supra.

[727] See text accompanying N. 285 Supra.

[728] See text accompanying Ns. 294 and 283 Supra.

Canal Draft EIR is misleading and untrue:

> ...Low summer flows are augmented by releases of stored water. If it were not for this augmentation, Delta outflow would be much lower and would even cease during many summers because of low runoff and upstream use.[729]

DWR is not alone in this reasoning; the State Board states in D1379:

> With the projects in operation, 1944 was the last year with negative outflows. However, USBR [BOR Exhibit No.] 564 shows that in the absence of the state and federal projects negative outflows would have occurred in the Delta in 20 years of the 26 year period 1944-1969 since commencement of operation of Shasta Dam. The period of computed negative outflow in 1966 and 1968 without the state and federal projects would have extended for three months. This illustrates the disastrous conditions that would presently prevail in the Delta in the absence of the releases from the state and federal projects.[730]

In the absence of the releases from the state and federal projects, it is postulated that upstream diversions would not have expanded to the extent they have today and there would be much more natural flow remaining in the stream.

Bureau's Salinity Control Commitment

Salinity control was to be a major project function of the state envisioned Central Valley Project.[731] When the Bureau took over the project, the agency very willingly assumed this project purpose. Table XIII lists over 125 instances in which the Bureau and other federal officials pledged the project to salinity control. This policy was reversed by Bureau Regional Director, C.H. Spencer, in 1957 when he said:

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[729] DWR, Draft EIR: Peripheral Canal, p. 11-24.

[730] SWRCB, D1379, p. 28.

[731] See text accompanying Ns. 210, 217, 218, 221, 227 Supra.

> ...I consider that the obligations of the Central Valley Project are satisfied when a satisfactory quality of water is provided at the intakes to the Contra Costa and Tracy Pumping plants."[732]

Furthermore, the Bureau has taken the position that it cannot meet the Delta water quality standards in D1379, issued by the State Water Resources Control Board in 1971, because Congress has not authorized the agency to operate the project for Delta water quality maintenance.[733]

This study has endeavored to recreate the period and reasoning for these later two positions which differ so strongly from those expressed in Table XIII.[734] However, presented below is a summary of the opinion that the Bureau has a moral and legal commitment to salinity control. One assumption is made in the discussion and that is those that benefit should pay. Who pays how much is considered in a subsequent discussion.

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[732] See text accompanying N. 301 Supra.

[733] See text accompanying N. 667 Supra.

[734] The period in which the Spencer Letter was cast is recreated in the text between Ns. 537-540 Supra. The Bureau's reasoning for restrictive compliance with State Board decisions is presented between Ns. 677-705 Supra.

Moral Commitment

The moral commitment is not overly complex. Over 125 times Bureau and other federal officials pledged the project to salinity control. Public support in the service area of a project is of paramount importance in gaining congressional approval and appropriations.[735] The information set forth in Table XIV clearly establishes the fact that the public believed the Bureau's salinity control commitments. This contributed to the state support of the project which aided the Bureau in obtaining large appropriations in the critical early life of the project. Very simply, promises made by the Bureau for twenty-two years (1935-1957) should be kept.

Legal Commitment

The legal commitment, as identified herein, stems from three sources: 1) a navigation function incorporated in the congressional authorization, 2) legal interpretation of the Bureau's accountability to Congress, and 3) the Federal Water Pollution Control Act of 1965.

The text between Ns. 265-267 sets forth the case that the Bureau has a legal obligation to maintain salinity control as a navigation function. Briefly, in 1935 the U.S. Army Corps of Engineers received congressional authorization to construct Shasta Reservoir in accordance with the project outlined by the Corps in Rivers and

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[735] BOR Regional Director Billy Martin emphasized this point before the California Legislature. Senate Committee on Agriculture and Water Resources. Hearings on Statewide Water Supply and Demand. January 14, 1975.

Harbors Document 35.[736] Congress also authorized the nonreimbursable sum of $12,000,000 to be applied towards the construction of Shasta Reservoir in the interest of navigation. The document clearly states salinity control is a nonreimbursable navigation function of Shasta Reservoir as the hydrological barrier that would be maintained by the reservoir would eliminate the need for a salt water barrier.[737]

When the President, a few days after the Corps authorization, granted funds to the Bureau for the project he said the funds are reimbursable in accordance with the reclamation laws (which do not provide for salinity control), but he also stated the project would provide salinity control.[738] The most significant action in this chain of events is the Congressional authorization that followed in 1937. The act does not make mention of salinity control and it places the project clearly under the provisions of the reclamation laws. However, the 1937 act reads in part:

> SEC. 2. That the $12,000,000 recommended for expenditure for a part of the Central Valley project, California, in accordance with the plans set forth in Rivers and Harbors Committee Document Numbered 35, Seventy-third Congress, and adopted and authorized by the provisions of Section 1 of the Act of August 30, 1935 (49 Stat. 1028 at 1038), entitled "An Act authorizing the construction, repair, and preservation of certain public works on river and harbors, and for other purposes", shall, when appropriated, be available for expenditure in accordance with the said plans by the Secretary of

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[736] See text accompanying N. 253, Supra.

[737] See quote accompanying N. 254 Supra.

[738] See quote accompanying N. 259 Supra.

> the Interior instead of the Secretary of War: Provided, that the transfer of authority from the Secretary of War to the Secretary of the Interior shall not render the expenditure of this fund reimbursable under the reclamation law.[739]

The $12 million fund included $5.63 million towards the elimination of a salt water barrier.[740]

On September 27, 1972 the California Assembly Committee on Water addressed the following question by letter to the Bureau and Regional Director Pafford answered with the following response before the committee in hearings on November 9-10, 1972.

Committee's question:

> Is salinity control an authorized function of the Federal Central Valley Project? In this regard, please trace the legislative history of salinity control through the findings of feasibility and Congressional authorizations of the Central Valley Project.

Pafford's response:

> Appended to our statement is our response to this question.
>
> In summary, salinity control per se of itself is not an authorized function of the Central Valley Project. Furnishing of water for agricultural, municipal, and industrial uses are authorized functions, therefore, salinity control as a means of providing water suitable for agricultural, municipal, and industrial use in the Delta is an authorized function of the Central Valley Project. However, use of water for this purpose has not been made nonreimbursable and the project has no responsibility to repel salinity in the Delta without payment for such services.

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[739] See quote accompanying N. 264 Supra.

[740] See text accompanying N. 255 Supra.

In other words, the Bureau is authorized to provide salinity control if it is paid for, but if it is not chargeable to the national treasury or a beneficiary, it is not authorized, as salinity control is not a nonreimbursable function. In the appended information referred to in the response, the Bureau rests its case on a finding by a three-man subcommittee of the Central Valley Project Studies.

The reader may recall from a previous discussion that the Central Valley Project Studies were organized in the mid-forties to address 24 problems.[741] The subcommittee filed "Appendix B - Report of Legal Subcommittee" of the larger report dealing with Problem 10, "What means exist or can be created for obtaining equitable payments toward the cost of the project from the beneficiaries of salinity control? What amounts should be paid by such beneficiaries?" The subcommittee recognized the $12,000,000 appropriation authorization, "...but so far the appropriation has not been made."[742] Based on this statement the Bureau contends, "...Appropriations from the General Fund for Navigation, flood control, wildlife, and recreation began in 1936 and have continued since that time. None of these appropriations have provided for a non-reimbursable allocation for salinity repulsion."[743]

To place the Bureau's current position in proper perspective, it is necessary to first review and explain the background and impact of the CVP studies and to examine the conclusions of other committees in the CVP studies. Present repayment provisions of the reclamation law were established in the Reclamation Project Act of 1939. The Central Valley Project was reauthorized in the Appropriation Act of 1940 and brought under the provisions of the Reclamation Project Act of 1939. The act of 1939 established cost allocation procedure and limited the nonreimbursable allocations to flood control and navigation.[744] Section 9a of the act sets up a procedure for authorization of the project, Section 9b of the Act provides that part of the total estimated costs which the Secretary of the Interior finds proper, may be allocated to flood control and navigation. Section 9c sets up the procedure for sale of water for municipal water supply and miscellaneous purposes.

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[741] See text accompanying N. 269 Supra.

[742] BOR, CVP Studies: Allocation of Cost, p. 53.

[743] Regional Director Pafford testimony before California Legislature. Assembly Committee on Water. November 10, 1972.

The Bureau confronted the repayment problems in the twenty-four Central Valley Project Studies initiated in 1942 and filed through 1947. The conclusions and recommendations were further refined by the Bureau and presented to Congress in House Document No. 146 (80:1) pursuant to the Reclamation Project Act of 1939.[745]

It should be realized that the Bureau bases its case on a three-member subcommittee report dealing with how much Delta agriculturalists should pay for salinity control--not the broad topic of the salinity control authorization. What creates concern is that the Bureau's current position completely ignores the report filed by the Committee for Problems 8 and 9; "What allocation of project cost should be made respectively to power, irrigation, navigation, flood control, salinity repulsion, and national security?"

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[744] Angel, "Aspects of the Central Valley Project," p. 294.

[745] BOR, Central Valley Project of California: Allocation of Cost and Feasibility Report bound as U.S. 80th Cong., 1st sess., House Document No. 146 (1947). See text in N. 272 Supra.

The committee for Problems 8 and 9 appointed a three-man subcommittee on salinity which recognized salinity control as both a reimbursable and nonreimbursable function. The subcommittee recognized that the committee on Problem 10 had identified a salinity control irrigation benefit of $200,000 per year but the Problems 8 and 9 subcommittee also recognized a $5,630,000 salinity control navigation benefit.[746] The subcommittee further stated, "It should be noted that this navigation benefit is entirely independent of and in addition to the benefits which will accrue to the agricultural interest of the delta."[747]

The thirty-two member Problems 8-9 committee endorsed the above findings of the three-member subcommittee on salinity and recognized a $5,630,000 salinity control, nonreimbursable navigation function. The committee said, "Owing to the means by which salinity repulsion is accomplished, there is as indicated hereinbefore a navigation benefit for which Congress has already authorized a

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[746] BOR, CVP Studies: Allocation of Cost (Problems 8-9). Appendix E, Report of Subcommittee on Salinity, pp. 169, 172.

[747] Ibid, p. 173.

Federal contribution in the amount of $5,630,000."[748] The total recommended allocation to navigation was $18,084,000: $12,454,000 for a direct navigation benefit and $5,630,000, for the elimination of a salt-water barrier.[749] As illustrated below the Secretary of the Interior allocated $18,083,000 to the project as a nonreimbursable navigation function.

Pursuant to the 1939 Act, the Bureau filed the Allocation of Cost and Feasibility Report which was bound as House Document 146 (80th Cong. 1st sess., 1947). The transmittal letter from J. A. Krug, Secretary of the Interior, to Harry S. Truman, President, portends the treatment of repayment for salinity control as presented in the volume. Pertinent portions are reproduced:

> The report concerns the engineering feasibility of the project, the estimated total construction or capital costs, the proper allocation of these costs to the various project functions, and the probability of repayment of the reimbursable costs by the revenue-producing functions.
>
> The Central Valley project has for its major purpose the transfer of Sacramento River water southward to the San Joaquin Valley where it is needed for irrigation and municipal and industrial water supply. At the same time, navigation, flood control, and salinity-repulsion benefits are accomplished as incidental parts of a well-rounded program of river regulation. Electric power is produced in quantities sufficient not only for project pumping but also through commercial sale to insure repayment of a large portion of total project costs.

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[748] BOR, CVP Studies: Allocation of Cost (Problems 8-9), p. 31. See also pp. 13, 21, 30.

[749] Ibid, p. 69.

The Central Valley project provides navigation benefits in the Sacramento River, flood-control benefits in both the Sacramento and San Joaquin Valleys, and substantial salinity repulsion benefits in the Delta area. When completed, the project will provide an annual average of 2,026,700 acre-feet of water, largely for irrigation purposes. The power plants when completed will provide for project pumping and commercial sale at the load centers 2,121,000,000 kilowatt-hours of firm energy and 100,000,000 kilowatt-hours of salable secondary energy annually, in association with a dependable capacity of 419,000 kilowatt-hours.

The basic plan of the project, and the design and construction of the physical features comprising it, have been thoroughly investigated by engineers competent and experienced in these matters. Upon the basis of these investigations, I have found that the project has engineering feasibility and will provide the services indicated.

Authorized and established under the provisions of the Emergency Relief Appropriation Act of 1935 (49 Stat. 115) and the First Deficiency Appropriation Act, fiscal year 1936 (49 Stat. 1622), the project was reauthorized for construction by the Secretary of the Interior under the reclamation laws, except as otherwise specifically provided, by the act of August 26, 1937 (50 Stat. 580) and the act of October 17, 1940 (ch. 89 54 Stat. 1198, 1199).

The actual expenditures toward construction of the project, through June 30, 1946, were $168,588,006. The estimated cost of the completed project, based on current costs as evident on January 1, 1946, is $384,314,000.

Thorough consideration has been given to the various possible bases of allocation of these costs, and the allocation that I have approved and adopted is as follows:

Navigation	$ 18,083,000
Flood control	31,444,000
Irrigation (including $3,074,600 for Contra Costa distribution system and $18,815,900 for canal capacity for future water).	221,551,600
Municipal and industrial water	9,091,800
Power.	104,143,600

The indicated returns will be accomplished through the supplying of water for irrigation purposes under contracts made pursuant to section 9(e) of the Reclamation

> Project Act of 1939, by contracting for the repayment of the cost of irrigation distribution systems under section 9(d) of the act, and by the sale of commercial power and municipal and industrial water at rates fixed pursuant to section 9(c) thereof.

The Secretary clearly states salinity control is an "...incidental part(s) of a well-rounded program of river regulation." Moreover, it does not appear, in the letter, under allocation of cost or a revenue producing function. A more detailed examination of the volume's interior reveals the Bureau's approach to repayment. Under the subheading "Description of Functions" (pp. 10-11), the document reads:

> 13. The Central Valley project, as authorized and at present partially constructed, will provide the following services when completed:
>
> (a) Navigation. --A minimum flow of 5,000 cubic feet per second will be maintained in the Sacramento River at all points below Chico Landing except for certain months in extremely dry years...*
>
> (b) Flood control. --...
>
> (c) Salinity repulsion. --The maintenance of a minimum flow of approximately 3,300 cubic feet per second at Antioch as proposed in operating schedules for Shasta (estimates range from 3,300 to 5,000 cubic feet per second, and no final figure is closely assured) is believed sufficient to prevent salinity intrusion in the Sacramento-San Joaquin Delta, thereby preventing such extensive crop damage as had been common in the recent past while at the same time permitting more beneficial use of lands in the affected area...
>
> (d) Irrigation and municipal water. --...
>
> (e) Electric power. --...
>
> (f) Recreation and fish protection. --...

The cost of salinity control is allocated to both navigation and irrigation under General Joint Cost. The total amount allocated to navigation is $18,083,000. Part of this allocation is the $5,630,000 authorized by Congress because of the elimination of a physical, salinity control barrier. The remainder is computed with a base figure of annual navigation benefits of $484, 000 computed with the alternative-expenditure method.[750] This figure is catapulted to a capital expenditure of $12, 453, 000 by calculating the annual benefit with 3 per cent per annum interest for fifty years.

Based on the above, this writer can only conclude the Bureau has charged a portion of the nonreimbursable navigation function to salinity control. Inescapably, therefore, the Bureau has a legal obligation to maintain this purpose.

The second legal commitment revolves around the salinity control testimony presented to Congress by the Bureau officials and Secretaries of the Interior. As presented between Notes 272 and 276 of this thesis, these officials testified to the House Appropriation Committee for several years that the project would maintain salinity control. This project function received a lot of attention in these hearings in the early years of the project but it received less emphasis as Shasta Dam was completed. It was a well recognized project function as identified by several congressmen and the U.S. Supreme Court.[751] The legal importance of the testimony is explained below.

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[750] The alternative-expenditure method in this case relates to the cost of a system of locks, and dams on the Sacramento River to provide the same navigation benefits. BOR, CVP Studies: Allocation of Cost (Problems 8-9) pp. 43, 44.

[751] See Table XIV.

Several acres of grasslands riparian to the San Joaquin River were deprived of the annual saturation afforded by the flooding river when the CVP Friant Dam on the headwaters of the stream began to control the floods. In 1950 the U.S. Supreme Court ruled in *U.S. vs. Gerlach* (339 U.S. 725) that the owners of these lands should be compensated.[752] The court based part of its decision on the reasoning that since the Bureau had annually requested and received appropriations to purchase the grasslands, Congress was aware of and approved the practice. The pertinent words of the court are reproduced below:

> ...Throughout administration of California reclamation projects it has been the consistent practice of the Bureau of Reclamation to respect such property [water] rights. Such has specifically been the Bureau's practice in connection with the Friant project, and this has been *reported to Congress*,[32] which has responded some nine times in the past twelve years to *request* for appropriations to meet such expense. We think this amounts, not to authorizations and declarations creating causes of action against the United States, but to *awareness and approval* of administrative construction.[753]

Footnote 32 of the above explains that the Bureau submitted several appropriation requests for the purchase of the grasslands and Congress granted the requests.

The courts reasoning embedded in the above is brought out in other portions of the decision. The issue at stake was whether Friant Dam was a reclamation or navigation project. The government, "...does not have to compensate for destruction of riparian interest over which at the point of conflict it has a superior navigation easement, the exercise of which occasions the damage."[754] Reclamation law, on the other hand recognizes the existence of prior rights. Thus the government argued that the project is a navigation undertaking. The court ruled Friant is a reclamation project with the following:

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[752] In H.D. No. 246 (85:1) p. 712.

[753] In H.D. No. 246 (85:1) pp. 710, 711. Emphasis added.

> From the beginning, it [Bureau] has acted on the assumption that its Friant undertaking was a reclamation project. Even a casual inspection of its [Congress] committee hearings and reports leaves no doubt that Congress was familiar with and approved this interpretation
>
> . . .
>
> But when a project has been regarded by the highest Executive authorities as a reclamation project, and has been carried as such from its initiation to final payment for these rights, and Congress, knowing its history, has given the approvals that it has, we think there is no ground for asking us to hold that the provisions of the Reclamation Act do not apply.[755]

Applying the message of the court in the above, the Bureau testified to Congress the project would be operated for salinity control, thus, the Bureau is bound by law to do so.

The Bureau has used the court's reasoning to justify its administrative duties on at least one occasion. In the late forties and early fifties, a great debate arose over the legal interpretation and administration of the 9(e) contracts between the Bureau and the agriculturalist.[756] The Bureau interpreted 9(e) in a way so that the contracts were written as utility contracts whereby the irrigators would continue to pay a flat rate for water which would be renegotiated after forty years. The agriculturalist objected strongly on the grounds the capital cost of the project attributable to agriculture would someday be paid for, but they would be bound by contract to continue paying the same rate.[757] The Bureau testified in court that since their interpretation of the 9(e) law was explained to the Congressional Appropriations Committee, it was in fact ratified. As stated by another observer of this litigation:

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[754] In Ibid, p. 711.

[755] In Ibid, pp. 713, 715.

[756] This was the famous Ivanhoe Case which is discussed between Ns. 346-347 Supra.

> They [the Bureau] sprung a United States Supreme Court case on us to back up the theory that where the Congress is repeatedly advised of the practice of a bureau, although it may not be justified by an act of Congress, that it amounts to a ratification...[758]

This writer does not profess to have at hand or fully comprehend all the legal ramifications of the court's reasoning express above. From the information presented, it appears that since the Bureau continued to advise Congress it would maintain salinity control, the agency has a legal obligation to do so.

The third legal consideration of the Bureau's obligation for salinity control was discussed at length in Chapter VIII under the subheading Delta Water Quality Objectives. The standards controversy focuses on the broader question of state vs. federal control of the state's water resources. The discussion herein will be limited to the problem of setting and maintaining Delta water quality objectives.

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[757] Congress has since restricted this interpretation. See text accompanying N. 305 Supra.

[758] Harry Horton, Attorney, Irrigation Districts Association, testimony before U.S. House. Committee on Interior and Insular Affairs, Special Subcommittee on Irrigation and Reclamation, Hearings CVP, Rights, Supplies and Uses, p. 261.

The Federal Water Quality Control Act of 1965 required the states to set water quality objectives for innerstate and coastal waters, acceptable to the Secretary of the Interior or the Secretary would establish them himself. California developed and submitted its standards - void of any significant Delta salinity objectives. The Secretary rejected the Delta objectives as insufficient and appointed a Department of Interior task force to develop additional objectives. The state adopted same but not all of the objectives developed by the federal task force and it committed itself to a full consideration of Delta water quality objectives which was executed after the state considered and ruled upon the two export projects' water right to divert from the Delta.[759]

The Secretary responded with two actions. First, he noted the state's commitment to additional hearings and second, the Secretary committed the CVP on an interim basis to the so-called B2 and B5 objectives included in the Interior task force objectives. At the same time, the Secretary reserved the Department of the Interior's. "...freedom of action with respect to the operation of the Central Valley Project".[760] These two actions seem to be a bit incongruous. On the one hand, the Secretary admonished the state for not adopting sufficient objectives, and on the other, he withheld commitment of the CVP to the objectives the state would adopt. Perhaps, the reservation was included so that the project would not be subscribed to less stringent objectives or more likely, objectives that would be viewed by the Secretary as too restrictive. Eventually, however, the state adopted a slightly modified form of the B2, B5 objectives.[761] Since these objectives are virtually the same as those adopted by the Secretary on an interim basis, it would seem reasonable that the Secretary would endorse the state's objectives and pledge the project to their maintenance in concert with the State Water Project. Such has not been the case. The Justice Department on behalf of the Department of the Interior has raised the legal question of the power of the state in issuing such decisions that impact upon the operation of the federal project.[762] At the same time, the Secretary has continued the commitment of the project to the maintenance of the objectives on an indefinite, interim basis.[763] It is considered reasonable here to assume the project will continue to maintain the objectives[764] but the point of issue is a broad philosophical one. It seems to the writer that the Secretary has a recognized commitment to the congressional directive in the 1965 law to uphold and share in the maintenance of the water quality objectives that have been established pursuant to the law.

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[759] See discussion in between Ns. 609-617 Supra.

[760] See text and quote accompanying Ns. 617-619 Supra.

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[761] See text accompanying N. 620 Supra.

[762] See quote accompanying N. 701 Supra.

[763] See N. 618 Supra.

[764] See text accompanying Ns. 642-646 Supra.

As pointed out in the text of Chapter VIII the Interior Department's water quality functions were transferred to the newly created Environmental Protection Agency (EPA) on December 2, 1970. On June 20, 1973 EPA approved the state's supplemental Delta water quality objectives which are essentially the B2-B5 objectives.[765] Also EPA is expected to approve even higher Delta water quality objectives in the June, 1975 Central Valley Basin Plan.[766] The Federal Water Quality Control Act Amendments of 1972 requires the EPA to enforce the EPA approved Delta water quality objectives if the state will not or cannot. If the Bureau chooses not to help meet the objectives, an awkward situation of one arm of the federal government vs. another will develop.

By necessity, this "brief" has been long and complex but it is summarized as follows:

- The Bureau has a moral obligation to maintain salinity control because it promised the people the project would be operated to do so.
- The Bureau has a legal obligation to maintain salinity control as an authorized navigation function.
- The Bureau has a legal obligation to maintain salinity control because it continuously told Congress it would do so. A U.S. Supreme Court decision upheld this reasoning in the Gerlach case.
- The Bureau has a legal obligation to maintain salinity control (Delta water quality objectives) pursuant to the Federal Water Quality Control Act of 1965 and the 1972 amendments.

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[765] See text accompanying Ns. 620-621 Supra.

[766] See text accompanying Ns. 630-646 Supra.

A brief postscript is necessary here to place the above discussion in proper perspective. If the court rules in favor of California in U.S. vs California then the Bureau will be bound to operate the CVP for the maintenance of Delta water quality control as stipulated in its water right issued by the State Board.[767] If this happens, the above presentation will become academic. However, should the Courts choose to rule on the side of U.S., then the above may provide legal nourishment for separate litigation to establish the Bureau's commitment to EPA water quality objectives.

DWR's Salinity Control Commitment

Due to the fact the Bureau continued to pledge Shasta Reservoir to the maintenance of salinity control during most of the SWP planning period, commitments to this purpose by state officials are not as numerous as those made by the Bureau. Nevertheless, it appears that the promises were sufficiently numerous so that DWR has somewhat of a moral obligation to maintain salinity control. In the following discussion the writer also identifies a legal obligation attached to the revenue bonds authorized in the Central Valley Project Act of 1933. When DWR, some thirty years after the passage of this act, decided to use the bonds for the SWP, this writer feels, the SWP also inherited the project purposes listed in the act - including salinity control.

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[767] See text accompanying Ns. 703-705 Supra.

This section does not attempt to identify DWR's complete legal responsibility for Delta water quality maintenance. Rather, the discussion concentrates on the role salinity control has played in the development and financing of the SWP. Aside from these two unrecognized or controversial commitments, there is no question of the fact DWR must carry out the legislative directive in the Delta Protection Act, and as a state agency, DWR must abide by state statutes including those that give the State Board the responsibility to condition DWR's water rights permits. This section will close with a brief discussion of these identified legal constraints to place the moral and CVP Act legal commitments identified herein in proper perspective.

One might question the purpose of even discussing the moral and CVP Act legal salinity control commitments in light of the fact the SWP is bound by other well recognized statutes to provide this function. However, it is felt that the discussion is of interest as it provides insight on the evolutionary role salinity control has played in the development of the project. It compares the degree of salinity control the project operators would now like to provide with that promised during the early development of SWP. The discussion also indicates the Delta water quality that would exist in the absence of other constraints such as the legislature and the State Board.

Moral Commitment

The introduction to Chapter V defines the differences between the California Water Plan and the State Water Project. The project is a physical scheme to store and transport water; the plan is an investigation.

The plan is a blueprint for possible development that was conducted in three steps. The first step identified the developed and undeveloped water supply in the state, the second forecast the "ultimate"need, and the third presented a plan to develop and transport the supply to the area of need. The California Water Plan considered not just the State Water Project, but the Central Valley Project as well. Thus, it is not always clear which project the plan is identifying when it speaks of salinity control.

Shasta Dam was in operation providing salinity control during the period in which the plan was developed (1947-57) and only two months before the plan was published, the Bureau reversed its salinity control policy with the Spencer letter in March, 1957.[768] Therefore, the 17 references to salinity control in the plan probably were made with the CVP in mind.[769] However, the Plan includes strong recommendations for the State Water Project[770] and the DWR Director, Harvey O. Banks, assured the California Senate a few months after the publication of the plan:

> The most important existing problems of the Delta are intimately entwined with problems of the remainder of the Central Valley and their solution depends in large part upon continued development of the water resources of the State.

and,

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[768] See text accompanying N. 392 Supra.

[769] See N. 397 Supra.

[770] See text between Ns. 287-390 Supra.

> Let me emphasize that no plan, federal or state, will take water from the Delta that is or will be needed for uses therein.[771]

Simultaneous with, and extending beyond the preparation of the California Water Plan, DWR executed the studies for the State Water Project. The development of the project proceeded on two fronts. The overall project was designed in three bulletins, the first in 1951 layed out the general concept while the second in 1955 determined the project's financial feasibility and the last in 1959 identified the route of the California Aqueduct. In a separate but related field of activity, the planners carried out the directive of the legislature as expressed in the Abshire-Kelley Salinity Control Barrier Acts of 1953, 55 and 57. Understandably project salinity control was predominantly considered in the three reports issued pursuant to these acts. However, a few commitments are contained in the other overall reports.

Even though the Bureau had been unwaveringly maintaining salinity control for seven years prior to the publication of the Feather River Project Report in 1951, the report states the Oroville facility is necessary to accomplish some objectives including salinity control.[772] Furthermore DWR Director Banks said seven years later:

> The reports of the Department of Water Resources in 1951 leading to the authorization of the Feather River Project recognized the water requirements for consumptive use and salinity repulsion in the Delta.[773]

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[771] See N. 404 Supra.

[772] See quote accompanying N. 455 Supra.

[773] See N. 457 Supra.

In the 1955 report state planners not only did not obligate the project to salinity control, but they temerariously assumed the Bureau would continue the full flow in the face of a state barrier and the state would salvage this supply.[774] In the last planning document (1959) before the voters approved the general obligation bonds to finance the project, no attention was given to salinity control. The report was, "...Directed principally to the single objective of determining the optimum aqueduct system to serve the long-range water needs of the areas to be served thereby."[775] The only attention given Delta water quality control was directed towards the identification of the quality of Delta export water.[776]

The general tenor in the barrier studies authorized by the Abshire-Kelley Salinity Control Barrier Acts of 1953, 55, and 57 was one of protecting project export water quality and minimizing releases. Since the Delta would be in the freshwater pool created by all barriers downstream from Chipps Island, the area would obviously be afforded a high quality water with these alternatives.

The first barrier study narrowed the consideration of alternatives to two: the Chipps Island Barrier and the Biemond Plan.[777] The second study identified the Biemond scheme (or Single Purpose Delta Water Project) as the recommended plan[778] and the third study in 1960 outlined the recommended operation of the facility.

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[774] See text accompanying N. 465 Supra. See also discussion between Ns. 563-540 Supra.

[775] See quote accompanying N. 466 Supra.

[776] See text accompanying N. 467 Supra.

[777] See text accompanying N. 510 Supra.

[778] See text accompanying N. 523 Supra.

Two significant actions occurred between the submission of the 1957 and 1960 studies. The Bureau redefined its salinity control policy in the Spencer letter[779] and the Legislature passed the Delta Protection Act.[780] Both of these actions placed considerable responsibility on the SWP to provide for a substantial amount of salinity control.

As outlined in the 1960 study, the Biemond facility was designed to provide a water quality level of 1,000 ppm chlorides 7 miles upstream from Antioch with an outflow of 1,000 cfs. The western Delta irrigationist would be supplied with an overland substitute supply.[781]

The above concept of relaxed instream western Delta quality, compensated for in part by an overland supply, carried through into the development of the Peripheral Canal and the November 19, 1965 criteria which represents the DWR's present position on salinity control in the Delta.

Not discounting the few salinity control commitments made by the Director plus those appearing in the 1957 California Water Plan and the 1951 project report, this project purpose did not in, and by itself, play a major role in the development of the State Water

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[779] See text accompanying N. 392 Supra.

[780] Codified as Secs. 12200-12205 and 12220. See discussion on p. 325 Supra.

[781] See text accompanying Ns. 527, 528 Supra.

Project. For several years the Bureau had not only established a strong commitment, but it was operating Shasta Dam to provide the purpose as well. Once this commitment evaporated with the Spencer letter, the state planners proposed their overland supply scheme which they continue to support. In summary:

- DWR's moral obligation to maintain salinity control does not approach that of the Bureau's.
- DWR's moral obligation to maintain salinity control is present, though minuscular.

Legal Commitment

As outlined in Chapter III, the state initially developed the CVP as a state project in the 1931 State Water Plan. In 1933 the Legislature passed the Central Valley Project Act authorizing the project and the issuance of $170 million in revenue bonds. In the same year, the voters sustained the act in a state-wide referendum.[782] The bonds were held off the market pending federal assistance in the form of interest free loans, or grants for flood control and navigation, or both. Without any aid, the state planners calculated the project would have operated at an annual loss of $2.8 million.[783] Rather than grants for a state project, President Roosevelt and later Congress, allocated the grants, and thus the project, to the Federal Bureau of Reclamation.[784]

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[782] See text accompanying Ns. 223, 224 Supra.

[783] See quote accompanying N. 230 Supra.

[784] See quote accompanying N. 258 Supra.

The Central Valley Project revenue bonds remained on the books unused and unaltered until 1951 when the Legislature authorized the State Water Project (then known as the Feather River Project), "...as units of the Central Valley Project separate and apart from..." and removed the $170 million ceiling from the CVP revenue bonds for the financing of the project.[785] Revenue bonds must be repaid by the project for which they are authorized. Thus, a project has to be financially sound before revenue bonds can be issued against it. These unlimited revenue bonds continued to be unused until the mid-sixties when they were issued against revenues from the hydroelectric facilities of the State Water Project.[786]

It is felt that the CVP revenue bonds are tied rather closely to salinity control. The Revenue Bonds were endorsed by the 1933 voters for specific CVP projects with specific functions. In the planning decade for the state CVP, salinity control was first to be provided by a physical barrier but subsequent studies indicated a hydraulic barrier consisting of reservoir releases and natural flows would accomplish the objective at less cost.[787] In their final planning document, Bulletin No. 25, the state engineers set the project's water quality objective at 100 parts chloride per 100,000 parts water (1,000 ppm) to be maintained at Antioch which they calculated could be accomplished with a net Delta outflow of 3,300 cfs.[788] Furthermore, this function was incorporated in the text of the Central Valley Project Act.[789] Thus, it is well established that the voters who approved the act in 1933, voted for a project that would maintain salinity control.

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[785] See N. 420 Supra.

[786] See text accompanying Ns. 480-485. To date DWR has issued $384,160,000 in revenue bonds. DWR, California State Water Project, Vol. 1, Bulletin No. 200, November 1974, pp. 26, 27.

[787] See text accompanying Ns. 182-201 and 208-210, 217, 218 Supra.

Salinity control was not a subdued project purpose as Representative Sam Yorty testifies:

> ...I recall very well the arguments relative to salinity control that we used in winning that election...I didn't understand then that we were committing a huge amount of water for that salinity control, but I certainly remember that we promised it would be done.[790]

It therefore follows that when the Legislature transferred this voter authorized financial program from the CVP to the SWP, the project purposes listed in the act should also be transferred. The SWP inherited the legal promises which included salinity control. In summary:

- Pursuant to the Central Valley Project Act of 1933 the SWP has a legal commitment to the maintenance of salinity control.

As stated in the beginning of this chapter, DWR is bound by two sets of laws to maintain salinity control in the Delta. The Delta Protection Act declares that the SWP and CVP shall provide salinity control and an adequate water supply for water users in the

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[788] See quote accompanying N. 210 Supra.

[789] See quote accompanying N. 221 Supra.

[790] See quote accompanying N. 227 Supra. See also text and accompanying discussion in N. 226 Supra.

Delta. The law recognizes the overland supply concept and the projects are forbidden from exporting waters to which the Delta users are entitled. Should an overland supply be implemented, the service area will be expected to pay for the quality in excess of the historical entitlement, but the Delta water users historical entitlement has never been established.[791]

Section 1257 of the California Water Code requires the State Board to consider the relative beneficial water uses when it appropriates water via a water right.[792] Simply stated, DWR, a state agency, must abide by the State Board's decisions, though the reasonableness of the Board's decisions may be challenged in court. Should the courts relax the standards in interim D1379[793] or should the Board relax them when they reopen the hearings for a final decision,[794] DWR will still be bound to the revised decision set by the court or the Board. This thesis does not address the reasonableness of the D1379 standards, it is mentioned here to point out DWR has a legal obligation to meet such standards whatever they might be.

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[791] See discussion on pp. 436, 437 Infra.

[792] In SWRCB, D1379, p. 9.

[793] See text between Ns. 671-676 Supra, for a discussion of the D1379 litigation.

[794] D1379 is an interim decision to be reopened by July 1, 1978. See discussion between N. 653-655 Supra.

Salinity Control Responsibility of Other Upstream Diverters

In October, 1974, DWR held public hearings on its Draft EIR: Peripheral Canal in Oakland, California. This writer volunteered testimony and the speaker soon opened the dialogue to a broader topic with the statement/question, "Do you think the other upstream diverters have a responsibility towards the maintenance of salinity control?" The issue is a legitimate one; anyone who looks at the problem must logically raise the same question. A logical response is contained in the following two questions. Have the other upstream diverters promised downstream water quality maintenance to the Congress or the public? Have the upstream diverters resulted in increased diversions of the natural flow? The message in the first question is rather obvious; the project's planners and operators pledged the upstream reservoirs to salinity control. The extent of this commitment is established in the Salinity Control Policy formation discussion for each project (Chapters IV, V, VI). Also, the reservoirs have indirectly reduced the natural flow in the Sacramento River as discussed in this chapter under the title of Salinity Incursion and Post Projects Periods.

Not discounting the above, upstream diverters before and after the project have reduced the natural outflow. The State Supreme Court ruled in 1920 that the upstream diverters do not have to leave 3,000 cfs in the Sacramento River to provide salinity control for the 1 cfs diversion for Antioch when both parties could be satisfied with the physical solution of moving Antioch's point of diversion upstream out of reach from the salinity incursion.[795] Some caution should be used in interpreting this decision to mean the upstream diverters do not have any responsibility to protect the quality and thereby water rights of downstream, senior diverters. Physical solutions are not always available and a court today may tend to consider other beneficial uses such as the marshland habitat for which a physical solution may not be possible.

The answer to the complex legal question of the upstream diverter's responsibility for downstream maintenance is beyond the bounds of this paper. This unresolved question, however, should not mask the two observations presented here and summarized below:

- The other upstream diverters never promised salinity control.
- By augmenting the natural flow and guaranteeing a dependable instream water supply, the project's reservoirs have fostered the expansion of stream diversions beyond the carrying capacity of the stream under natural conditions, thereby indirectly reducing the natural discharge. Thus the projects have had a greater impact on the natural flow than other upstream diverters.

Salinity Control: Who Pays?

No other question is so emotionally charged as who pays for salinity control. If the projects continue to maintain a high outflow they will have to find a project purpose to charge it to or pass the charge to project customers. Since SWP recipients are already paying a high price and face escalating cost with the increase charge in power, this added burden could prove to be quite a hardship.[796] Due to the CVP financing structure, the high price of outflows will not adversely affect these customers to the same degree.[797]

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[795] For a discussion of the Antioch Case see text between Ns. 130-131 Supra.

Aside from being emotional, the question is also technical in that it expresses the identification of the Delta irrigationists' historic water right. Since this right has never been identified it is difficult to determine how much outflow - above the historic right - the irrigationist must pay for. The following discussion identifies this right as the low flow, summer outflow that existed before Shasta Dam was completed in 1944.

The positions taken by DWR, BOR and Delta water users on who is responsible for salinity control varies widely. Delta growers have continued to maintain that they have a historic or vested right to a year-round supply of good quality water. This right, they aver, is senior to those of subsequent upstream diverters.

DWR realizes it has a limited responsibility to maintain salinity control or compensate the diverters for the reduced flow that results from the operation of their project. The Bureau contends it has no salinity control responsibility to Delta diverters. The positions of the two agencies is illustrated in DWR's proposed one/third formula discussed below.

Realizing the projects may eventually (with the peripheral canal) reduce the Delta outflow and consequently the number of days western Delta appropriators will be able to divert from the channels, DWR has proposed a one-third approach whereby DWR will pay one-third of the added cost to the diverters, BOR will pay one-third and "all other" upstream diverters will pay one-third. Two municipal water users in the Delta have entered into such an agreement with DWR.

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[796] See text accompanying Ns. 493-498 Supra.

[797] See text accompanying Ns. 302-306 Supra.

The Bureau contends it has no legal obligation to compensate western Delta water users - one-third or otherwise. Nevertheless, the Bureau does participate with DWR and western Delta interest in discussions and negotiations to identify the historic right and the positions of the three parties.[798]

The general merits and elements of the one-third approach are discussed below under proposed agricultural charges. It is mentioned here to identify the positions of the project operators in the repayment controversy.

Special circumstances have aggravated the development of a solution in the Delta. Reconnaissance studies usually precede most BOR projects. Service areas are identified and contracts are negotiated and consummated before water is delivered. Such is not the case in the Delta, the Bureau and DWR must provide salinity control to export project water from the Delta.[799] Even with the elimination of this project necessity with the Peripheral Canal, the projects will have to maintain Delta water quality for fish and wildlife (see Fig. 15). As illustrated in Fig. 17, the Neomysi's (oposom shrimp) objective calls for an outflow almost equal to those required for agriculture. To summarize the point, the projects cannot hold back water to force the hand of the western Delta appropriators. There are only two avenues of arriving at a resolution; negotiation and litigation.

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[798] California Legislature. Senate Select Committee on Salinity Intrusion in Agricultural Soils, Intrusion of Ocean Salinity: San Francisco Bay and Sacramento-San Joaquin Delta. January 4, 1971. pp. 17-19.

[799] See text between Ns. 545-550 Supra.

The writer makes two assumptions in approaching this discussion: 1) the cost of a portion of salinity control has been paid for as a CVP navigation function, and 2) those that benefit should pay.

As established in the discussion of the Bureau's Salinity Control Commitment in this chapter, the Secretary of the Interior, in 1947, charged $5, 630, 000 of the CVP cost to the maintenance of salinity control as a navigation function. By maintaining a hydraulic barrier, Shasta Reservoir outflows, it was reasoned, would eliminate the need for a salinity control barrier and thereby provide a navigation benefit. The document in which the Secretary made this navigation allocation stated that the desired salinity control level can be maintained with a 3, 300 cfs outflow. Thus, an outflow of up to 3, 300 cfs is a paid for navigation function.[800]

The second assumption is rather obvious; all that benefit should pay. This includes navigation, fish and wildlife and western Delta beneficiaries. The navigation payment has already been made as a cost allocation. The other two beneficiaries should not pay in excess of their benefits or in the case of the irrigationist, their ability to pay.

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[800] See text between Ns. 744-750 Supra.

Agricultural water from the projects is usually subsidized by other uses such as power with higher economic returns per acre foot. As discussed in Chapter IV, the price of CVP agricultural water does not reflect the cost of developing that portion of the supply.[801] SWP agricultural users do pay their allocated cost (after power pays its maximum cost) but suffice it to state, this cost is within their ability to pay. Similarly, it may be concluded, the Delta agriculturalist should not be expected to pay beyond their ability to pay.

Navigation

As stated above, the Secretary of Interior has already allocated $5,630,000 of the capital cost of Shasta Reservoir to the maintenance of salinity control as a navigation function. The two other beneficiaries are fish and game and western Delta diverters.

Fish and Wildlife

The 1946 Wildlife Coordination Act (and subsequent federal statutes) amended the Reclamation Project Act of 1939 to allow the Secretary of the Interior to declare project cost allocated to the preservation and propagation of fish and wildlife as nonreimbursable.[802]

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[801] See discussion accompanying N. 306 Supra.

[802] Public Law 732, 79th Cong. (62 Stat. 1080) in H.D. No. 246 (85:1) p. 415; Public Law 89-72 (89) July 9, 1965: Public Law 93-251 (93) 88 STAT. 33. March 7, 1974.

It appears that a portion of the CVP outflow could be charged to the federal treasury for this beneficial use. The lack of such action is bewildering. The project is already maintaining the outflows, the nonreimbursable allocation would improve the financial position of the project at no additional cost to the project. Perhaps the Bureau theorizes that allocating the cost of the outflows to fish may jeopardize their position in negotiations with Delta diverters. The more fish and navigation pay, the less irrigationists may be willing to accept payment. Allocating cost to navigation and fish acts as insurance that the outflows will be made. The insurance would be very valuable if the Peripheral Canal were constructed and the project would not have to maintain Delta water quality as it does now to protect the export water. The possibility also exists that the Bureau is more interested in purveying water than preserving fish. Whatever the reasoning, one can only conclude that since the project has spent millions on the Red Bluff, Lewiston (Trinity), and Nimbus (American) fish hatcheries, it has an obligation to maintain Delta outflows for these anadromous fish. Congress has provided the mechanism by which the outflows can be paid for.

Similarly, Assembly Bill 12 of the 1966 Legislature provides a continuing annual appropriation of $5 million from tideland gas and oil revenues to reimburse project capital expenditures for recreation and fish and wildlife enhancement.[803] State planners have already allocated $157.4 million to this purpose which will extend the $5 million annual appropriation, "...through about 2040...".[804] Thus, this means of repayment is obligated for some time unless DWR taxes it beyond 2040 or seeks legislative approval for additional funds. It seems a bit ironic that DWR is allocating $27.8 million to the capital cost (and 98% of the operation and maintenance) of the upper Feather Reservoirs for recreation, fish and wildlife enhancement while at the same time not allocating any of this storage water to Delta outflow.[805] One could take the position this water is paid for by this purpose and it should be reused in the Delta for such. At any rate, one must question the reasoning that recreation and fish and wildlife enhancement are promoted in one area but not acknowledged in another. Of course, the expenditures for the Upper Feather Reservoirs increases the project's water supply at little or no cost to the customers; acknowledgements and expenditures in the Delta would use the project's water for Delta outflows.

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[803] DWR, Bulletin No. 132-70, p. 52.

Agriculture

The most elusive topic undertaken in this thesis is how much should the Delta agriculturalist pay. A great deal of thought has been given to this question but the answer remains unresolved. As stated before and again here, all beneficiaries should pay in proportionate to their benefit. The key to how much the Delta growers should pay is the identification of their historical entitlement - a task that will not be put to rest here. It should be mentioned that the State Board has retained a consulting engineer, Harvey O. Banks, to determine the extent of the western Delta's benefits from the projects summer outflows. As this thesis was being prepared for its final reading the study was submitted to the water rights branch of the State Board, but it has not been released to the public.[806] It may be assumed that if the report indicates western Delta diverters, including some industry, have benefited from the project, the State Board may ask the State Attorney General to bring action against the diverters for compensation. The reader should be cautioned this is only a guess by one rather distant from the decision making and the report may indicate the benefits from the projects are not as extensive as some may guess. The purpose in mentioning the study here is to underline the uncertainty of the historical entitlement.

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[804] DWR, Bulletin No. 132-74, p. 75. It is noted that the 2040 period is a 5 year extension of the "enhancement" fund over the projected in Bull. No. 132-73. See text in N. 479.

[805] DWR, Bull. No. 132-73, pp. 68-91.

In the literature reviewed, four references to proposed charges to Delta agriculturalist were uncovered. A CVP study committee proposed a charge; the State Water Project Authority identified a Delta charge in feasibility studies to purchase the CVP; a charge was inferred with the November 19, 1965 criteria; and a charge is contemplated in the one-third formula mentioned above.

As discussed earlier, a Central Valley Project Studies' Report examined the benefit Delta growers receive from Shasta Reservoir outflows. The study based its recommendations for a

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[806] Spontaneous conversation with Kenneth R. Henneman, associate of Harvey O. Banks, Consulting Engineer, Inc. March 15, 1975.

$200,000 annual charge on the estimated crop loss between 1924 and 1942 which averaged .82 per cent of the annual value of crop production loss (see Table XII). As discussed earlier, the Bureau considered the recommendations in the studies in allocating the project cost in House Document No. 146 (80:1). Salinity control benefits were set at $1,603,600 annually. Estimated annual benefit for prevention of crop damage was raised from the recommended $200,000 to $203,600 and the annual economic benefit of better and more profitable land use was set at $1,400,000.[807] The $203,600 is the exact figure reproduced in Table XII as the average annual crop loss (1924-42) before Shasta Reservoir. The Bureau contrived the $1,400,000 figure. The problem committee (Committee on Problem 10) dealing with salinity control as part of the Central Valley Project studies, would not place a value on increased crop production due to the better quality water provided by Shasta as "...it would not be possible to demonstrate the benefit with enough certainty to support a charge against the water users."[808] Nevertheless, the Bureau assigned a value of $1,400,000 which represents five per cent of the average crop value for the period 1924-42.

When the state Water Project Authority was studying the purchase of the CVP, the Authority assumed one source of income would be $0.50 per acre for the "367,000" irrigated Delta acres, or $183,500. This figure, "...is used as representing an equitable charge for the benefits received from a firm water supply."[809]

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[807] U.S. Congress House. H.D. No. 146 (80:1) p. 30.

[808] BOR, Central Valley Project Studies: Allocation of Cost (Problems 8-9), p. 49.

According to Cunningham, "...The November 19th Agreement contains important payment provisions which will be effectuated by the Delta Water Agency's per acre assessments. The assessments are expected to provide a $200,000 annual payment to the Bureau of Reclamation, an amount which theoretically offsets the Bureau's cost of providing the water quality called for by the November criteria."[810] Cunningham's work is extensively documented but the source of information is not given. The November 19th criteria is published in Appendix B and it contains no reference for payment. Perhaps the agreement referred to here includes the criteria plus other important considerations such as repayment.

Municipal and Industrial water supplies on the Contra Costa northshore divert their water supply at no cost from Suisun Bay and the western Delta in the high runoff winter and spring. The remainder of the year they purchase CVP water via the Contra Costa Canal. Realizing the projects will eventually cause a greater increase and duration of the incursion, and a greater reliance on the canal water, DWR has proposed to pay these water users one-third of the added cost with the idea BOR will pay one-third, and all upstream diverters the other third. This is more an approach than a charge consideration and the approach is not fully workable in the western Delta as the major season of diversion is the summer. Should an overland supply be implemented with a concomitant greater summer incursion, virtually all of the supply would have to be conveyed overland. This would bring the controversy back to the central question of how much of the overland supply water is a historical entitlement and how much is new or project water. If, for the sake of presentation, ninety per cent of the overland supply is identified as historical then a substantial portion of repayment (two-thirds) would fall upon BOR and upstream diverters. Since the Bureau disclaims any such responsibility, and a means has not been developed for assessing upstream diverters (much less their willingness to be assessed for such), this approach would probably be very difficult to implement for Delta irrigationist.

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[809] Water Project Authority, Feasibility of State Ownership and Operation of the Central Valley Project of California, Bulletin No. 2, March, 1952, p. 77.

[810] Cunningham, "Is Negotiation a Solution?", p. 216.

One problem that has not been addressed in all of the proposed charges is that the degree of benefit from outflows varies through the Delta, but all charges anticipate a uniform per acre levy in the Delta. Such an approach does not acknowledge that the western Delta will receive a major share of any quality maintenance guaranteed by repayment. Since incursions first occur and last longer in the western Delta, this area will benefit more than the central or upstream farms. One might expect these Delta upstream diverters to insist on a greater charge to the western Delta growers.

At this point, the seldom recognized symbiotic relationship between Delta growers and the projects should be presented. This will, in part, explain the slow progress in resolving the repayment question.

A previous discussion illustrates that high outflows are necessary to protect the quality of the export water with the present export system.[811] These outflows exceed those necessary for water quality maintenance for in Delta use. Delta growers have benefited from the project necessity of protecting export water quality. Moreover, the agriculturalists aggravate the water quality maintenance by discharging their degraded tail water or drainage back into the Delta channels.

But the relationship does not work just one way. By maintaining the Delta levees, the growers reduce or hold the tidal prism to its present size. The tidal prism is the amount of water exchanged between low tide and high tide in an estuary. Since the islands are below sea level their abandonment and flooding would increase the surface area of tidal influence and the tidal prism in the Delta. Greater outflows would be necessary to fill this void and hold back the potentially larger incursion pressing upstream on the high tide.[812] An obvious question that could be raised here is whether the projects could export water across the Delta without the levee maintenance.

The Delta growers provide another not so obvious benefit for the project. Delta growers use approximately 1.3 MAF each year,[813] but if the levees were abandoned and the islands flooded, the surface water over the agricultural land would evaporate at the rate of 1.8 MAF each year. If this land had remained in tule swamps the evaporation-transpiration loss would be over 2.5 MAF per year. The evaporation-transpiration of native vegetation is greater than surface evaporation is greater than irrigation evapo-transpiration.[814]

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[811] See text between Ns. 545-550 Supra.

[812] See text accompanying and discussing N. 711 Supra.

[813] BOR, Central Valley Project Studies: Allocation of Cost (Problems 8-9) p. 63.

The purpose of presenting the above is not to suggest the Delta growers should be given a credit against the price they pay for salinity control but to illustrate the projects will not try to price the Delta growers out of business. With the Peripheral Canal, Delta exports will be independent of the Delta water quality but the benefits provided by Delta levees may still exist. Should the water quality standards in D1379 stand or the projects meet (voluntarily or otherwise) the water quality objectives in the Basin Plan, the projects will still have to maintain a high outflow.[815] D1379 relaxes the agricultural requirement of 1,000 ppm chlorides at Blind Point to the same standard at Ematon and Jersey Point should an overland supply be provided the western Delta. Thus, the outflow necessary for agriculture will be reduced from about 4200 cfs to 1800 cfs. At the same time, the Neomysis standard (1,000 ppm Cl^-, Chipps Island) will still require an 4,000 cfs. (See Fig. 17). Thus the projects will continue to have a substantial outflow requirement and the maintenance of the Delta levees will aid the projects in maintaining this water quality.

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[814] Calculated with a surface area of 400,000 acres with 40,000 covered by water at all times. DWR, Salinity Incursion and Water Reclamation Appendix to Bull. No. 76, p. 94. The evapotransporation rate for tules is 9.6 AF/acre and 5.0 AF/acre for open water. Since some of the land might have supported only "other luxuriant vegetation" with an evapo-transporation of 6.1 AF/acre, the total maximum value of 3.47 MAF was reduced to 2.5 MAF. Evapo-transporation rates taken from Div. W.R., Bull. No. 27, p. 75.

[815] See the discussion between Ns. 630-646 Supra.

The charge of $200,000/year proposed in the CVP Delta studies and upped to $203,600 by the Secretary is perfectly reasonable. This represents the economic benefit the Delta growers have gained from the project. Because the Delta crop value increased over that amount in the 1924-42 period during which the $200,000 year was developed, the figure is out of date. Incursions of the same size today would result in the loss of higher per unit priced crops and therefore cause greater economic loss. However, other CVP water prices were consummated in the forties and fifties and it may still be fair to use the $203,600 figure for Delta growers.[816]

Some take the position that the Delta growers along with other beneficiaries are financially responsible for all the reservoir releases necessary to augment the Delta outflow. As explained elsewhere, this writer takes the position that the reservoirs have indirectly reduced the natural outflows. Before Shasta Dam was constructed, diversions from the Sacramento River had reached their maximum as the summer low flows held the expansion of irrigated agriculture in check. Farmers would not put in crops and divert natural flows in May and June if there was a reasonable chance the water would not be there in July and August of most years. By guaranteeing a high flow in the otherwise low flow summer, Shasta Reservoir releases have fostered the expansion of upstream diversions to take all the natural flow plus some reservoir flows.[817] Thus the financial responsibility for the reservoir flows necessary to replace the preproject natural outflows rest somewhere between the upstream diverters and the projects.

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[816] For example see the agreement discussed in N. 215 Supra.

Delta diverters, along with other outflow beneficiaries in the Delta are responsible for the theoretical outflows that would have been necessary to maintain Delta water quality in the preproject period. Early calculations it will be remembered set the agricultural objective at 1,000 ppm chlorided 0.6 mile west of Antioch, which it was figured could be met with an outflow of 3,300 cfs.[818] Reservoir releases to meet this objective in the water years between 1921-1942 would have varied from a low of 64,000 acre feet in 1937 to 1,262,000 acre feet in 1931, equaled 363,000 acre feet in median year 1936 and averaged 476,000 acre feet for the period.[819]

Dividing the 476,000 acre feet by the suggested annual charge of $203,600 yields a $2.34 per acre foot charge. This is a respectable price for agricultural water, other project customers on the Sacramento River pay $2.00/acre foot.[820]

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[817] See text between Ns. 725-728 Supra.

[818] The difference between this figure and that estimated by others in Fig. 17 to maintain 1,000 ppm at Blind Point a point downstream from Antioch may be attributable to the export pumps which require a larger compensating outflow.

[819] BOR, CVP Studies: Allocation of Cost, (Problems 8-9) Table 27 - Use of Water released from Shasta storage. p. 62.

[820] See text in N. 215 Supra.

One thing seems rather obvious and that is if the Delta growers had agreed to the $203,600/year price several years ago they would now have the CVP in a contract to maintain an outflow of 3,300 cfs. At about $0.50/acre/year this expense may prove to be less than the legal fees the Delta growers have spent in negotiation and perhaps future litigation. It would certainly be less than the resources expended by all parties in this matter.

Summary

The foregoing discussion is summarized in the following eight points:

- A settlement on who pays for the outflows has been aggravated by the fact outflows are a project necessity.
- Salinity control is a paid for CVP navigation function.
- Federal statutes allow the Secretary of the Interior to charge project cost allocated to fish and game preservation to the national treasury. The Bureau has not charged any Delta outflows to this purpose. Is the Bureau more concerned with preservation of the water supply than the preservation of fish?
- The SWP is allocated $5 million per year for recreation, fish and wildlife enhancement. DWR has scheduled these funds through the year 2040 with no allocation for outflows. DWR has obligation 95% of the cost of the upper Feather Reservoirs ($27.8 million) to recreation, fish and wildlife enhancement. These projects will develop water supply for the SWP. Delta outflows enhance fish and wildlife at the expense of project water. Thus, it appears DWR is reluctant to allocate funds to a bonified "enhancement" if it does not produce secondary benefits.
- As waste dischargers, Delta irrigators degrade Delta water quality.
- By maintaining the levees Delta growers reduce the tidal prism and therefore the outflows.
- Delta agriculturalist use less water than the Delta would evaporate under natural conditions.

- An annual charge of $203,600 to Delta growers for salinity control is both reasonable and proper.

State Water Project: Why?

As in many academic research endeavors this thesis has uncovered several questions peripheral to the main topic that, due to the usual time and resource constraints, must be left unanswered. The most fertile area of unsolved questions in these pages, or in the literature reviewed, is that surrounding the development of the State Water Project.

Upon reflection, the searing words of the southern California Representative and later, Los Angeles Mayor, Sam Yorty, come to mind, "...I just say in conclusion, Mr. Chairman, ...it seems to me that this Feather River project is just some kind of a political scheme, ...I don't understand either the basis of it or the implications of it ... I can't believe that it is a really sound bonafide proposal for water conservation."[821] From the material reviewed, the overall and dominant conclusion that could be reached is that some state officials carried their departmental biases well beyond the bounds of the public trust.

Ostensibly the project was developed so that California would have more direction in determining her water resource development. From the literature reviewed it is felt that the project was born in the womb of discontent over Section 2 of the 1902 Reclamation Law which states a recipient of project water must not own more than 320 acres of land (160 each for man and wife).[822] Strong attempts were made in Congress to remove the application of this section to the CVP--they failed.[823] Studies to determine the feasibility of state purchase of the project were launched and the Legislature appropriated funds for the purchase.[824] The State Supreme Court ruled against the law (4-3) but the U.S. Supreme Court unanimously reversed the decision.[825] Thus, there was one recourse left, the state would build its own project without acreage limitation. DWR began construction work for the Oroville Reservoir with a $25 million allocation from the 1957 legislature.[826]

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[821] Reproduced on first page of Chapter V *Supra*.

Bureau CVP project reports issued in the late forties and early fifties have delivery canals drawn to almost every corner in the Central Valley. The CVP San Luis Canal was to stretch almost to Buena Vista Lake in the Tulare Basin thereby supplying water to an area now supplied by the State Water Project.[827] Similarly, the Bureau launched reconnaissance studies to determine the feasibility of conveying water to the area south of the Tehachapi Mountains.[828] Thus, this project, backed by the national treasury, would have taken care of the state's water needs.

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[822] The law is reproduced in the text accompanying N. 324 Supra.

[823] See text between Ns. 332-345 Supra.

[824] See text between Ns. 356-363 Supra.

[825] See text between Ns. 346-347 Supra.

[826] See text accompanying Ns. 367 and 438 Supra.

[827] See text in N. 368 Supra and APPENDIX I in Hansen, CVP: Federal or State? which is a BOR, CVP Map titled "Central Valley Project Ultimate Plan," (March, 1955), Scale 1:2,220,000.

As discussed in Chapter IV, the CVP has a very favorable financial arrangement. The project has the most favorable cost:yield reservoir sites in the Sacramento Valley, and the Trinity division produces four crops of power. The only major pumping cost for the project is the Delta-Mendota canal lift at Tracy plus the lift to fill San Luis Reservoir. In addition to the favorable reservoir sites and the surplus revenues provided by power, the cost of the project allocated to agriculture is interest free. And, each time a reservoir or canal is added to the project, the entire project is refinanced. Power revenues from Shasta Dam that were to flow into the national treasury fifty years after its construction, are rescheduled for the national treasury fifty years after the latest addition to the project. The combination of these three factors yields cheap water for the consumer and the financial ability to develop marginal reservoir sites and extend canals to every potential service area.[829]

The state traded this federal largess for the elimination of the acreage limitation when the Legislature authorized A. D. Edmonston's Feather River Project in 1951.[830] Edmonston had no legislative authority or funds to conduct the study. The report states the study was paid for by the California Central Valley's Flood Control Association, which was also a member of the State-wide Committee for California Ownership of the Central Valley Project.[831]

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[828] See text above and discussion in N. 370 Supra.

[829] See text between Ns. 302-306 Supra.

[830] The authorization is quoted in the text accompanying N. 418. The economic advantages of the elimination of the acreage limitation in the SWP service area is identified in the text accompanying N. 372 Supra.

The apparent misuse of the State Engineer's Office is exceeded only by the legislative response to the report. The report clearly states the Feather River Project was found to be economically unfeasible but the legislature approved the project and reissued the 1933 Central Valley Project revenue bonds for its financing.[832]

In summary:

- The major reason for the formulation of the SWP is to circumvent the CVP acreage limitation.

Need for the Peripheral Canal

Probably no other water resources facility has been surrounded by so much controversy as the Peripheral Canal. A recently issued Draft Environmental Impact Report on the project by DWR measures about 1-1/2 inches thick. The report drew 836 responses measuring 20 inches thick.[833] The project is not the last north-south water fight in the state but it represents the most significant since the Central Valley Project Act was put on the state ballot in 1933. There is a physical limit to how much northern California water can be transferred south through the Delta with the present export system. The Delta acts as a bottleneck or control valve on future exports.[834]

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[831] See text accompanying N. 411 *Supra*.

[832] See text accompanying N. 416 and quote accompanying N. 418 *Supra*.

[833] DWR District Engineer Robin R. Reynolds, before the San Francisco Section of the American Society of Civil Engineers, February 1975.

Many involved in the controversy realize this fact and characteristically, the emotionally charged in the north oppose the project because without it "L. A." will not be able to take "our" water.[835] Groups to the south of the Delta support the project for opposite reasons.

A third identifiable group in the controversy is the Delta and western Delta interest. Since the present system of exportation assures this group a maximum quality water, they strongly oppose the Canal. Probably the most vocal and active of these groups is the Contra Costa County Water Agency (CCCWA) which was established by the legislature in 1957. Contra Costa County extends from the western Delta to San Francisco Bay. See Fig. 2. In truth this is a political organization for:

> ...Unlike the majority of the county water agencies in the state, the CCCWA is neither a user nor supplier of water. Rather than operating as a source of water, it is designed to represent the water users within its boundaries... It may do any and every act necessary... so that sufficient water may be available for any present or future beneficial use or uses of the lands or

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[834] See quotes accompanying Ns. 547 and 551 Supra.

[835] Los Angeles has a double barrel aqueduct delivering water from the Owens River N. 223 Supra. The Metropolitan Water District of Southern California, located south of the Tehachapi Mts, is the largest contractor of SWP water. Los Angeles is one of 27 member agencies of Metro and it receives about 12 per cent of Metro's water deliveries.

> inhabitants of the agency...' It also has full powers of litigation in any action which involves the use or ownership of water used within the agency's area.[836]

DWR Director Gianelli made this observation of the CCCWA:

> There is something almost schizophrenic about the saber-rattling of Contra Costa County's politically oriented water agency while those responsible parties delivering and using water in that country are cooperating....(The State does not) intend to let a small band of western Delta extremists, who have no responsibility for delivering water to anyone, upset a plan for the protection of the Delta to which the vast majority of agriculturists and industrialists have agreed. It seems strange... that the extremists whose area has been getting a free ride for many years would attempt to jeopardize the future of their area... by opposing projects which are vitally needed to serve the vast majority of people within out State.[837]

And the polemic position of the CCCWA attorney:

> The sole concern of these two agencies has been the delivery of water of high quality to Southern California and the San Joaquin Valley. There has been a ruthless and brutal disregard of the effect of these tremendous exports on the existing economy of the Delta and Bay Region.[838]

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[836] Cunningham, "Negotiation: A Solution?" in U.S. Davis Law Review (1969), pp 216, 217 quoting the Delta Water Agency Act of 1968.

[837] In Cunningham, "Negotiation: A Solution?" p. 837.

[838] Statement of John A. Nejedly, District Attorney of Contra Costa County and attorney for the CCCWA, Press Release, January 3, 1968. Mr. Nejedly now represents this area in the State Senate. Other elected officials from the area have found such a strong stand is very popular with the constituents. Mr. Nejedly replaced the late State Senator George Miller, Jr. who authored the Delta Protection Act discusses previously at page 330 Supra. Former Congressional Representative Gerome Waldie and DWR Director Gianelli have had many a spirited debate and when Representative Waldie did not seek reelection in order to campaign for the Governorship in 1974, his seat was won by George Miller's son.

Having identified the emotional-political element involved in the Peripheral Canal controversy; the study now concentrates on analyzing the need for the project as it relates to future exports, the off-stream storage alternative, and the recurrence of the Critical Dry Period (1928-34).

Water Supply Commitment

Since the state's water resources occur predominately in the north and the need is mostly in the south, and the Peripheral Canal will eventually be required to export these waters, the need for the Canal is related to the anticipated buildup in transfers. Forestalling this commitment would forestall the need for the canal, accelerating it would have the reverse effect.

For the most part this section will examine only the SWP commitment. The SWP is obligated by contract to deliver 4.4 MAFA from the Delta by 2020. The Bureau on the other hand is planning for a Delta transfer of 4.1 MAFA based on anticipated demand. Should this demand not develop, the project is not committed to deliver the full amount projected.

From a previous discussion it may be recalled that the SWP customers signed contracts in the early sixties to receive accelerating project water deliveries through the year 2016.[839] The contracts stipulate that the recipients must pay a Delta charge plus the capital component of the conveyance charge whether or not they receive their contracted water.[840] For convenience of discussion, this financial commitment will be referred to as the base charge. Assumptions and projections used to forecast service areas future needs should be well founded to commit both parties to such a binding contract for fifty-five years in the future (1965-2016). Recipients are bound to pay for the water; DWR is bound to deliver it.

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[839] See text between Ns. 471-474 Supra.

Since the study limitations do not allow the time or resources to compare the past and present projections for each service area, statewide projections are utilized. Growth trends in some service areas, no doubt, differ from the statewide projections, but the writer feels the comparison is sufficiently sensitive to reflect the growth and expansion rate in most of the service areas.

Figure 18 illustrates DWR's state population projections for the year 2020 developed in the years 1957-1974. In 1957 DWR estimated the ultimate (2020) state population at 53 million people. This 2020 projection was increased slightly to 54 million in 1966, but by 1970 it was obvious the rapid population expansion experienced in the fifties just wasn't being sustained and the projection was scaled down to 45 million. The present 2020 population projection is set at 36.6 million, a 27 per cent reduction from that forecast in 1966 just eight years prior.

From the foregoing discussion it seems perfectly reasonable to conclude that the municipal purveyors of SWP water have more water contracted than they need. What is also painfully clear is

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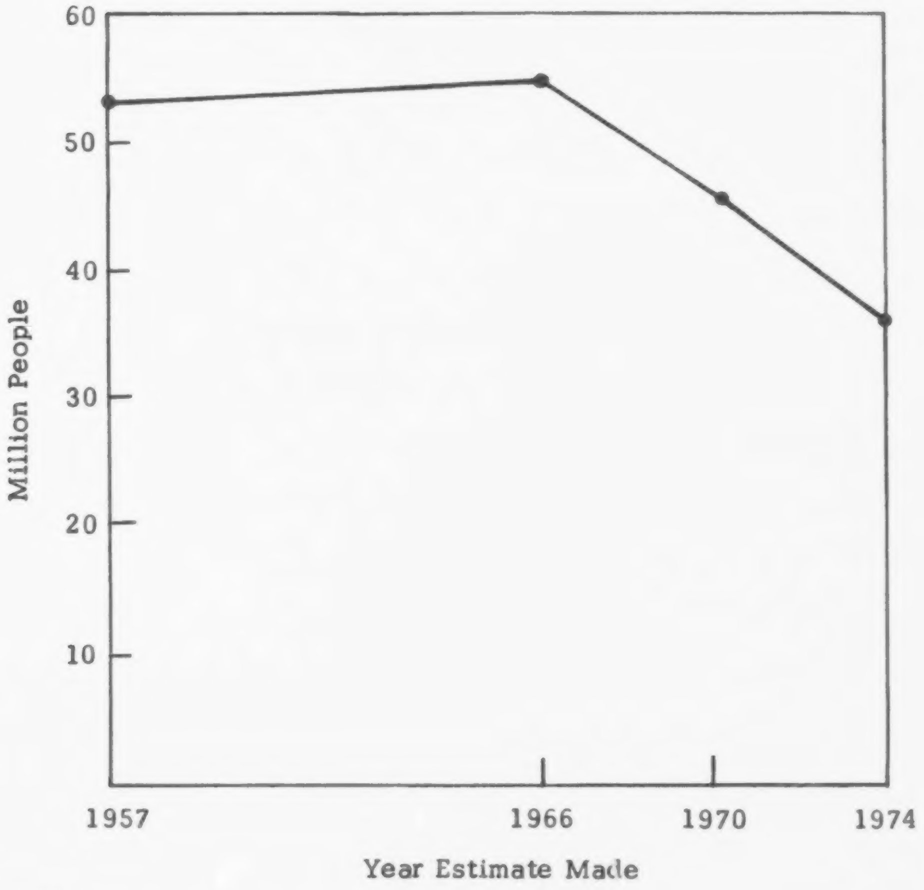
[840] See text between Ns. 499-500 Supra.

FIGURE 18

COMPARISON OF DWR'S POPULATION PROJECTIONS FOR 2020



Source:

1957: DWR, The California Water Plan, 1957, 2020 population not given. Value computed by dividing ultimate municipal, industrial water use by 1950 municipal, industrial water use (Table 3) and multiplying the results times the 1950 population, (pv).

1966, 70, 74: DWR, The California Water Plan Outlook in 1974, Bulletin No. 160-74, November, 1974 Summary Report p. 10.

that they have to pay the base charge (Delta charge plus the capital component of the conveyance charge) for the contracted water, even though the full amounts are not needed. Since the delivery of the water will only add the pumping charge to the base charge, most of the municipal contractors will take their water even if they do not need it. The over commitment to receive project water plus the inflexibility in the contracts combine to create an artificial demand on the Delta pool.

A brief perusal of the Metropolitan Water District of Southern California's supply and demand bears out this deduction. As the largest contractor of SWP water, this agency is scheduled to receive 2.01 MAFA by 2016 that must be pump-lifted 2000 feet over the Tehachapi Mts. at the cost of about 5 barrels of oil per acre foot of water.[841] Irrespective of the population growth, this water purveyor for over 4 million people must continue to pay the base charge through about 2020.

Metro claims it needs all its contracted amount mainly because its present appropriation of 1,212,000 AFA from the Colorado River will be reduced to about 550,000 AFA when the Central Arizona Project is completed sometime between 1985-1990.[842] This facility will enable Arizona to divert its total allotment from the Colorado River. However, it is recalled from a previous discussion that Metro first signed a contract for 1.5 MAFA of SWP water in November, 1960. When the U.S. Supreme Court ruled in favor of Arizona and Metro realized its Colorado River appropriation would be reduced by 600,000 AF, the contract was renegotiated in 1964 and the SWP allotment raised to 2.01 MAFA.[843] The total supply of 2.56 MAFA (0.55 MAFA Colorado water and 2.01 MAFA SWP water) was identified in the early sixties with high population forecast and since these forecasts are rapidly falling, the real demand or need for this water no longer exists. DWR bears out this observation:

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[841] David N. Kennedy, Assistant General Manager, The Metropolitan Water District of Southern California. Statement before California Legislature. Senate Committee on Agriculture and Water Resources in Hearings on Statewide Water Supply and Demand. January 16, 1965.

[842] Ibid. Mr. Kennedy does state Metro has begun to restudy future water demands in the district but there is no hint of reducing the SWP contracted supply.

> New supplies from the State Water Project should be more than adequate to meet 1990 water demands, even with the projected reduction of about 780,000 acre-feet per year in Colorado River supplies including some reallocations for power plant cooling in the desert areas. The increase in State Water Project supply and its substitution in part for Colorado River water should markedly lower the dissolved salts content of Southern California water supplies. Indicated annual 1990 demands range from 650,000 to 1,030,000 acre-feet less than 1990 total water supplies assuming the full contractual commitments of the State Water Project are available to the region.[844]

Metro will continue to take SWP water for three reasons: 1) The real cost will only be the incremental cost of the conveyance charge over the base charge; 2) SWP water is vastly superior in quality over Colorado River water;[845] and 3) Metro can sell its Colorado River water to other purveyors.[846] Thus, the SWP water that may now be considered surplus because of the declining population growth, will be used for the three reasons cited above. Paramount of the three is the artificial pricing system that, for the most part, relates the price of the water to a 1960, 64 contract, not the true cost of the amount of water delivered.

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[843] See text between Ns. 471-472. It is also pointed out in this discussion that DWR continued to contract water four years after the contract was amended in 1964. Thus, one may conclude, that the Metro augmentation was unrestricted in quantity and the District fully satisfied its water use projections made in the early sixties.

[844] DWR, The California Water Plan: Outlook in 1974, Bulletin No. 160-74, Summary Report November, 1974, pp. 3, 4.

Aside from creating artificial demand, the lack of flexibility in the contracts reduces the competition for other water supplies such as desalinization and wastewater reclamation. One Los Angeles County official states:

> The California [State] Water Project has made such large quantities of good quality water available in Southern California that the perceived need for

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[845] Colorado River water at the point of diversion averages 140 ppm total dissolved solids (1972). To date, attempts to reduce this concentration have been unsuccessful though the effort is intensifying. See Colorado River Board of California, Need for Controlling Salinity of the Colorado River, August, 1970. SWP water quality approximates that in Table XVII. Metro has committed $1.3 billion to the construction of a distribution system by 1976 to blend and distribute SWP water with Colorado River water on a 50:50 ratio. "Water Resources Report," California Builder and Engineer September 27, 1974. Vol. 80, No. 18, p. 30.

[846] Metros' Colorado River Aqueduct passes near the top of the Coachilla Valley in route from the river to the service area. Irrigationists in this valley have been purchasing Colorado River water from Metro since 1972 due to the surplus afforded by SWP water. Los Angeles Times August 4, 1972, p. 42. Also, the author has learned of at least one instance in which Metro has sold SWP water. It was to the Orange County Water District for ground water replenishment. "Chino Creek and the Santa Ana River have put on weight; And On Them it Looks Good." Metropolitan Water District of Southern California, Aqueduct, Vol. 41, No. 3, Fall, 1974.

reusing water has been substantially reduced.[847]

Because of potential pathogens and viruses, reclaimed wastewater has limited application. However, this water can fill many uses such as irrigation, and industrial use as demonstrated by the reclamation facility now being constructed by the Central Contra costa Sanitation District.[848] and the Whittier Narrows Reclamation Plant that has been reclaiming wastewater for several years. Moreover, stringent new state and federal wastewater treatment[849] requirements will mean that the add-on cost for additional treatment for reclamation will be much less. Also, the cost for desalinization has been reduced from $1.20 in 1962 to $0.75 per thousand gallons in 1970.[850] The potential of using these water sources has been greatly reduced by the financial commitment of the SWP.

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[847] Joe Hayworth, Information Officer, Sanitation Districts of Los Angeles County, "The Role of Wastewater Reclamation," before the Commonwealth Club of California. November 13, 1974. The Central Costa County Sanitation District is presently in the process of constructing a facility to reclaim municipal wastewater for industrial reuse. The manager of the Contra Costa Water District had this to say about the reclamation program before the Commonwealth Club of California, September 12, 1974, "Many technical and administrative obstacles at both the local, State and Federal levels had to be overcome. Probably the most difficult was convincing the U.S. Bureau of Reclamation to allow us to defer our contractual CVP supplies to the future, allowing reclaimed water as a substitute. In this case, we found it necessary to go directly to Secretary of the Interior Rogers Morton, who personally approved the amendment of our bug-term contract with the U.S.B.R."

[848] Ibid.

[849] Public Law 92-500 calls for Best Practical Treatment by 1977 and Best Available Treatment by 1983 and no discharge of pollutants to the navigable waters of the nation by 1985. Authorized by the voters in 1972 and again in 1974 the state is issuing $250 million in bonds to pay for 12.5 per cent of most of the municipal cost to meet these federal goals. The federal legislation authorized $18 billion in grant funds to pay 75 per cent of the municipal wastewater

It appears obvious, that such a large commitment as the SWP should have never been built for a 2020 target, based on a few years of accelerated growth. It is perfectly sound to plan for such a delivery but the construction should be phased in steps to meet projected demands. A commitment too far in the future incorporates too many uncertainties and it simultaneously reduces the flexibility to deal with these uncertainties.[851]

For example, if the A. D. Edmonston Pumping Plant for the Tehachapi crossing had been initially built at half size, flexibility would have allowed for either; 1) not building the second half for lack of demand; 2) building the second half when the demand develops; 3) sizing the additional facility more closely to the actual demand; or 4) building the facility over a lower ridge to the coastal route.

The last alternative would be very valuable as this route would take much less power to operate, since it would not have the

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treatment upgrading cost. Over $400 million in construction grants for treatment plants have been authorized in 1975, and $600 million will be funded in 1975. State Water Resources Control Board Executive Director Bill Dendy, as cited by Patrick Heffernan, "Jobs and the Environment", California Journal, April, 1975, p. 124.

[850] Gordon C. Rausser and Gerald W. Deal, "Uncertainty and Decision-Making in Water Resources," in California Water, Ed. by Seckler, p. 240. This cost has probably escalated since 1970 due to the escalation of oil prices.

[851] On the planning for uncertainties see Ibid.

great pumping lift required by the Tehachapi crossing. The present and future cost of the 8 billion kilowatt hours of electricity the project will need, were never realized in the power rich fifties.[852] However, the incorporation of flexibility would have enabled DWR to evaluate the coastal route alternative in light of present day certainties versus the uncertainties of the fifties.

The point is thusly made; the project has little or no flexibility and the inflated municipal water deliveries could deprive other areas of need, provide artificial demands for more storage reservoirs and, of course, hasten the need for the Peripheral Canal.

Not discounting the above, the most significant water supply commitment in this state is for irrigated agriculture. Over 85 per cent of the state's developed water supply goes to irrigation,[853] and the state leads the other states in this activity with cash farm receipts of over 8 billion dollars in 1974.[854] All too often, however, the allocation of more water to agriculture is a commitment to the greening of California more so than a commitment to sound water resource management. Consider the following statement by the Republican nominee for the state governorship a few months before

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[582] See discussion in text between Ns. 495-498 and in N. 496.

[583] N. 435, Supra. Present urban water use is 5 MAFA while agricultural use is 32 MAFA, "...Or about 85 percent of total water use in the State.," BWR, Bull. No. 160-74, p. 2.

[584] California Department of Food and Agriculture, "Answers to Ten Questions Relating to Water Use by Agriculture," prepared for and delivered to California Legislature. Senate Committee on Agriculture and Water Resources, in Hearings on Statewide Water Supply and Demand. January 14, 1975.

the November, 1974 election:

> The water, the [New Melones] dam would generate will bring more agriculture land into production, and with more production, food prices will drop - and that's a major way of beating inflation. The question is whether we want to provide more jobs for the construction industry and lower the cost of food or provide raft trips for a few.[855]

It has been pointed out in a previous discussion that the April, 1973 New Melones Decision by the State Board restricts the Bureau from filling this reservoir because the Bureau could not identify a need for the supply.[856] Thus the statement above is virtually all emotion and no fact.

Similar emotional fired statements can be found elsewhere. Following a State Senate hearing on the state's water supply and demand, Sen. Howard Way of Tulare County was quoted as saying, '"We do have a water crisis" in California and "there is hardly any other place to look" for additional water development but the North Coast..." the net impression of the hearing is that we are going to have to move ahead with development of additional resources." He mentioned specifically the Peripheral Canal in the Sacramento-San Joaquin Delta..."[857]

The positions taken by the two gentlemen presented above illustrate the degree of emotion involved in managing the resource.

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[855] Houston Flornoy quoted in "Water Resources Report," California Builder and Engineer, September 27, 1974. Vol. 80, No. 18, p. 34.

[856] See discussion accompanying N. 699 Supra.

[857] Sacramento Bee, January 29, 1975. P. A5.

All too often the press is equally emotional or biased to the point of misunderstanding and misinforming the public in water resource matters. Hirshleifer points out the press never really understood how much the SWP cost,[858] and the bias of a Central Valley newspaper in promoting new projects is identified.[859] Also, on the eve of the November, 1974 election, a newspaper poll of 17 other newspapers portrayed unanimous support for the New Melones Reservoir which appeared on the ballot as proposition 17. The reasoning was the same as that expressed above by the candidate for Governor, we need more water to increase the food supply and lower the price of tomatoes in the local grocery store.[860]

The purpose of the above discussion is to underline the fact, California's water resources are sometimes promoted to the public for their political mileage and emotional appeal, not their bonafide need. In the following discussion the author will attempt to put this need in its proper perspective.

In 1972 U.S. farmers received $655 million not to grow crops. California payments in excess of $20,000 per farm went to 1,861 farms for a total of $80.1 million.[861]

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[858] See text accompanying N. 476 and quote accompanying N. 484 Supra.

[859] See January 11, 1974 editorial in Sacramento Bee and subsequent articles in this newspaper identified in N. 496 Supra.

[860] San Francisco Sunday Chronical, Examiner, November 3, 1974, p. A24.

[861] Of these payments, 340 totaling $16.5 million were made in Fresno County alone. San Francisco Chronicle May 2, 1973, p. 50. See also N. 433 Supra.

The agricultural industry of this state is truly impressive. California supplies 25 per cent of the table food consumed in the United States and 40 per cent of its fresh fruit and vegetables. It accounts for about 10 per cent of the United States agricultural exports. With a diversification of over 200 different crops, California leads the nation in the production of 46 commercial crops and livestock commodities.[862]

The continued growth of this industry is predicated upon the availability of Class I irrigation land, an ample water supply, and a market for the goods at a price slightly above production cost. Indications are that water is the least critical of the three.

From Chapter V it is remembered that the ultimate agricultural water need in the state was set by DWR in 1957 at 41 MAF for 20 million acres of irrigable land.[863] Actually there are 22 million acres of irrigable land in the state with approximately 9 million under irrigation. Of the 13 million acres of potentially irrigable lands almost 10 million are Class 3 or lower due to poor soil, noncompatible climates and inaccessibility. This leaves about 3 million acres of Class I land[864] that could or should eventually be irrigated.

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[862] Ca. Dept. of Food and Ag., "Answers to Ten Questions," in State Senate Hearings on Statewide Water Supply and Demand. January 14, 1975.

[863] See text accompanying Ns. 379, 377 Supra.

[864] Ca. Dept. of Food and Ag., "Answers to Ten Questions" in State Senate Hearings on Statewide Water Supply and Demand. January 14, 1975. In the same hearings DWR Director Teerink told the Senate Committee there are 22 million irrigable acres of which 8.8 are irrigated.

About half is located in the San Joaquin Valley.[865]

The pace at which this land will be converted from dry crops such as cereals and grains to high value irrigated crops will depend upon the ability of the market to absorb these goods at the purchase price. High value specialty crops such as oranges, grapes, almonds and such are sold on a national and international affluent market apart and separate from the food grain, food crisis of the world. International happenings such as the flow of foreign exchange funds into Middle Eastern oil purchases will reduce the purchasing power in the market for California agricultural commodities. As summarized by the California Department of Food and Agriculture:

> Increasing production for many of California's specialty crops should be done in conjunction with or in response to increasing demand. Increased production must be matched by increased ability to purchase.[866]

DWR and BOR are presently investigating the construction of the Mid-Valley Canal to supply 0.5 MAFA to areas in Kern County now overdrafting the ground water supply. As planned DWR would convey this water south from the Delta where the Bureau will divert this water into the Mid-Valley Canal to the surface area.[867] Since the Bureau has almost 2 million acre feet of reserve water supply, no additional reservoir storage will be needed for this project.[868]

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[865] See N. 2 Supra.

[866] "Answers to Ten Questions" in State Senate Hearings on Statewide Water Supply and Demand. January 14, 1975.

[867] DWR, Bull. No. 160-74, p. 2. Stuart T. Pyle, Engineer-Manager, Kern County Water Agency, statement before California Legislature Senate Committee on Agriculture and Water Resources in Hearings on Statewide Water Supply and Demand. January 14, 1975.

Also to be considered is that these irrigationists are now using ground water and the possibility exists that the imported water can be diverted from the Delta in the winter and stored for the irrigation season as ground water recharge. Recharge programs in Kern County have been used for some time with both Kern River water and the Friant-Kern Canal water.[869] Such a program would have little or no negative impact on the Delta hydrology as diversions would be made in the high natural runoff winter period. Simultaneously, no demands would be made on the present storage supply. Similar arrangements for future agricultural deliveries or the conversion of some present summer surface deliveries to winter ground water deliveries would have the simultaneous benefit of not requiring costly storage facilities or adding to the present hydraulic stress in the Delta. DWR is participating in feasibility studies in ground water storage in Southern California (south of the Tehachapi Mts.).[870]

Off-Stream Storage Facility

One obvious alternative to the Peripheral Canal not found by the writer in DWR's Draft EIR on the project, is the off-stream storage alternative.[871] Utilizing the winter pumping concept explained above, San Luis Reservoir is an off-stream storage facility. The reservoir is pump filled from the Delta in the winter with high natural outflows. In the summer the water is released as necessary. Very simply, DWR could construct another such facility to supplement the acceptable Delta pumping rates. It could be that no such reservoir site exists south of the Delta or such a facility could not be sized sufficiently to provide the necessary supplemental supply. The point to be made is, the potential project should have been discussed in the Peripheral Canal Draft EIR as an alternative to the Canal.

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[868] DWR Director John R. Teerink, statement in State Senate Hearings on Statewide Water Supply and Demand, January 14, 1975.

[869] Stuart T. Pyle, Engineer-Manager, Kern County Water Agency statement in Ibid.

[870] DWR, Bull. No. 160-74, p. 6.

[871] John MacLeod Mac Diarmid, statement before the California Legislature. Senate Committee on Natural Resources and Wildlife in

Recurrence of the Critical Dry Period (1928-34)

In the Draft EIR for the Peripheral Canal DWR states:

> The studies show that for 3 dry years of the 33-year hydrologic study period used (1921-22 through 1953-54) there is a risk that either water quality criteria or quantity requirements in the project service areas could not be met if the Peripheral Canal is delayed beyond 1980. The chances of experiencing a dry year increases with each year of delay.[872]

The above may be an over-simplified and misleading statement. The "risk" will only occur if there is a recurrence of a water year as dry or drier than the three driest years in the 1921-22 through 1953-54 hydrologic study period. A simple examination of the historical hydrologic data and mathematical predictions using the total period of record are much better indicators of the recurrence frequency of dry years than the simple statement from above, "the

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Hearings on The Draft Environmental Impact Report on the Peripheral Canal Project. December 11, 1974.

[872] See quote accompanying N. 551 Supra.

chances of experiencing a dry year increases with each year of delay".

The 33-year hydrologic cycle from water year 1921-22 through water year 1953-54, used by DWR to determine the above "risk" includes five critical water years; 1924, 1931, 1932, 1933 and 1934.[873] DWR does not state in which of the critical water years the "risk" would occur. One would assume the most demand on the reservoir storage supply would be made in the series of dry years (1931-1934). However, in a separate study, the Bureau indicates the driest year on record, 1924 (or 1923-24) would draw Shasta Reservoir down greater than 1931 or 1932.[874] Thus, one may deduct that a "risk" year would only occur if there were a recurrence of the 1924 hydrologic conditions or a recurrence of the 1928-1934 hydrologic conditions known as the critical dry period.

Table XXII portrays the actual and computed inflow to Shasta Reservoir from 1850 to 1975. Estimates from 1850 to 1872 were made by correlating precipitation patterns during this period with precipitation patterns of years with inflow records. The 1872-1895 estimates (except for 1889 and 1890 two years of no record) were made with gage heights recordings of the Sacramento River at Red Bluff. Stream-flow records at Red Bluff were utilized from 1895

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[873] DWR, Draft EIR: Peripheral Canal, p. 111-51. However, the Bureau calculates 1932 is not a critical year. See Table XXII.

[874] BOR, Water Yield Risk: Total Water Management Study for the Central Valley Basin California, Working Document No. 5, February, 1975. p. 7.

TABLE XXII

CRITICAL YEAR AND CRITICAL PERIOD FREQUENCY

ESTIMATED SHASTA INFLOW

(in 1,000 acre-feet)

Water year	Inflow	Water year	Inflow	Water year	Inflow	Water year	Inflow
1850	10,410	1882	5,450	1913	5,001	1944	3,688[b]
1851	2,800[c]	1883	4,720	1914	8,361	1945	4,859
1852	6,005	1884	7,300	1915	7,849	1946	5,905
1853	11,180	1885	4,610	1916	6,924	1947	3,909[b]
1854	6,380	1886	8,900	1917	5,039	1948	5,415
1855	4,850	1887	4,720	1918	4,028[a]	1949	4,317[a]
1856	4,030[a]	1888	4,030[a]	1919	5,389	1950	4,133[a]
1857	3,980[b]	1889	6,880	1920	3,294[b]	1951	6,315
1858	4,230[a]	1890	12,582	1921	7,396	1952	7,785
1859	5,660	1891	4,637	1922	4,611[e]	1953	6,540
1860	6,400	1892	5,118	1923	3,648[b]	1954	6,541[e]
1861	5,200	1893	7,891	1924	2,479[c]	1955	4,113[a]
1862	13,730	1894	5,895	1925	5,065	1956	8,832
1863	4,050[a]	1895	7,837	1926	3,728[b]	1957	5,369
1864	3,550[b]	1896	7,247	1927	6,987	1958	9,698
1865	7,200	1897	6,858	1928	5,120	1959	5,037
1866	6,480	1898	3,871[b]	1929	3,208[b]	1960	4,733
1867	9,530	1899	4,340[a]	1930	4,190[a]	1961	5,073
1868	13,230	1900	5,896	1931	2,539[c]	1962	5,261
1869	5,800	1901	6,073	1932	3,694[b]	1963	7,002
1870	4,680	1902	7,122	1933	3,471[c]	1964	3,905[b]
1871	3,100[c]	1903	6,586	1934	3,321[c]	1965	6,963
1872	6,650	1904	9,523	1935	4,917	1966	5,299
1873	3,680[b]	1905	7,038	1936	4,673	1967	7,334
1874	5,060	1906	7,259	1937	4,125[a]	1968	4,772
1875	3,460[b]	1907	8,486	1938	9,548	1969	7,667
1876	8,950	1908	5,494	1939	3,465[b]	1970	7,902
1877	6,480	1909	8,605	1940	7,030	1971	7,328
1878	10,520	1910	6,156	1941	8,716	1972	5,374
1879	5,650	1911	6,668	1942	7,619	1973	8,009
1880	7,800	1912	4,726	1943	5,893	1974	8,606
1881	9,420					1975	6,102[f]

[a] Shasta inflow below normal (4-1/2 million acre-feet).
[b] Shasta inflow less than 4 million acre-feet.
[c] Critical year. See Appendix B for definition of critical year.
[d] DWR classifies 1932 as a critical year using the same definitions used by the Bureau. DWR, Draft EIR: Peripheral Canal, p. .
[e] DWR utilizes the water years 1922-1954 for its hydrologic input for determining supply and demand. Notice this period includes 5 of the 7 critical water years in the 125 years of record.
[f] Forecast, BOR, Report of Operations, December 1974.

Source: BOR, Water Yield Risk: Total Water Management Study, February 1975, p. 10.

to 1926, and in 1926 a recording gage was installed at Kennett, a short distance upstream from the Shasta Damsite. Since 1943, Shasta operations records have been used to compute the inflows.[875]

Analyzing the information in Table XXII, the three "risk" years in DWR's 1921-22-1953-54 hydrolic study would probably be either 1924, 1933 and 1934 or 1931, 1933 and 1934. Water years 1931 and 1932 would not be "risk years" in the first set as they are not as dry as 1924 and do not therefore qualify as isolated risk years. Critical dry years 1933 and 1934, occurring at the end of the historic dry period would have the greatest negative impact on accumulative storage.

If the first set were the case, and the isolated 1924 critical year was a "risk" year, then the only other isolated critical years on record, 1851 and 1871, would probably not be risk years. Both years record higher inflows than 1924 and both are preceded by normal water years, especially 1851 which is preceded by a 10.4 MAF inflow year. Also, the 1871 inflow is preceded by six years of above average inflow, and the inflow in 1871 is greater than the inflow in critical year 1931, which as reasoned above, cannot be a "risk" year if 1924 is a "risk year".

If on the other hand, 1931, 1933 and 1934 are the "risk" years, none of the isolated critical years, 1851, 1871 and 1924 can be "risk" years. Remembering there are only three "risk" years in DWR's analysis, there would have to be a repeat of the 1928-1934 critical dry period in the 124 period of record to have any "risk" years.

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[875] _Ibid,_ p. 7.

Summarizing the above, an isolated water year, critical enough to be classified as a "risk" year hasoccurred once in 125 years of record. A critical dry period containing either 2 or 3 "risk" years hasoccurred once in 125 years of record.

The past may be the key to the future, but predicting the recurrence of a dry year or cycle is not a precise exercise. Rainfall and runoff could be drier and a dry cycle last longer than any other year or series of years on record. Natural phenomena knows no bounds. Yet there is a framework of probability that can be established with the past record and acceptable mathematical exercises. In the absence of controlling the precipitation and runoff, these are the best planning tools available.

It is not known precisely how often the 1924 "risk" year would recur under a mathematical analysis. The Bureau has used two techniques to analyze the recurrence of a critical year which may give some indication of probability. The definition of a critical year can be found on p. B2 of Appendix B. Depending on the years used as a statistical base, results from a statistical analysis indicate a critical year will occur from 1.8 to 12 per cent of the time. The highest per cent was derived with the 1922-1954 hydrologic period, the same period used by DWR for the studies in the Peripheral Canal Draft EIR. The 1872-1921 period, not containing the historic critical dry period produces the low 1.8 per cent value. The 1850-1971 period produces a 5.0 per cent recurrence, which is slightly more than the actual 4.8 (6 divided by 125) frequency in Table XXII.

The Monte Carlo procedure was also used to evaluate the frequency of critical years. The 50 water years from 1922-1971 were randomly interchanged to produce several sets of 50 year periods. It will be remembered that the definition of a critical year includes the inflow of the previous years. Thus, the sequence of individual years is important. A sequence of 10,000 years was generated from the 50-year period and the sequence of 10,000 years was then divided into 100 year blocks. The number of critical years in each block ranged from none to 13 and averaged 7.[876]

Based on the 125 years of record the isolated "risk" year has occurred once. Mathematical analysis indicated the six dry years recorded in the 125 years of record may occur from 0 to 13 times in a 100 year period. One method produces an average frequency of 5 per 100 years and the other 7. Since these values are higher than the actual of 4.8, the actual may be slightly low or the synthetic frequency high. In the absence of any other information it may be assumed the isolated 1924 "risk" year may not be expected to occur more than twice in 100 years.

According to the Bureau, "A rigorous mathematical definition of the probability of occurrence of the critical dry period has not been made." Without revealing the technique used the agency states, past work indicates the critical period "...falls in the range of once in 100 years to once in 400 years".[877] DWR state the critical dry period, "...could be expected about once every 200 years on the average".[878]

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[876] *Ibid.*, pp. 7-13.

Based on the above the writer concludes DWR has overstated the need for the Peripheral Canal by:

1) Using an extremely short hydrologic period containing the critical dry period, to forecast overall supply, and

2) liberally portraying the critical dry period, without qualification, to justify the early construction of the Peripheral Canal.

In the aftermath of D1379, DWR and BOR quickly worked up figures based on the critical dry period to portray the impact of the decision on the projects. Ronald Robie had this to say when he was a member of the State Water Resources Control Board, "I would like to point out in passing that the change of the seven-year dry period (1928-34) used in project design occurring is only once in more than a thousand years."[879] Ronald Robie has recently been appointed Director of DWR and the Bureau has recently offered up for public discussion the use of the critical dry period in planning.[880]

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[877] Ibid, p. 14.

[878] DWR, Bull. No. 160-74, p. 17.

[879] "The Delta Decision: Water Rights In A New Era," before the Water and Energy Committee of the Los Angeles Chamber of Commerce. February 14, 1972.

[880] The Water Yield Risk study cited in Ns. 874-877 Supra is part of an ongoing water management study conducted by the Bureau with a substantial amount of public input. The writer does not know where the public input stops and the Bureau takes over in developing and presenting the results. The program is too young to pass judgement but on the face of it it does seem like an excellent first step to disseminate some of the decision making.

Until change is initiated, the summary points in the above paragraph will stand.

Several issues have been raised in this section on the need for the Peripheral Canal. They are summarized as follows:

- The further development of the Northern California Water Industry depends on the construction of the Peripheral Canal.
- Much of the opposition against and support for, the canal is based on the preceding point not the judgement of the benefits and disbenefits of the canal to the Delta.
- The SWP is a poor example of planning, resources (financial and water) are projected much too far in the future without flexibility to deal with uncertainties.
- The SWP - Metropolitan Water District of Southern California contract commits a large amount of water from the Delta pool to create a surplus in the District.
- The above contract creates an artificial demand for this surplus.
- Alternatives of wastewater reclamation and desalinization are foregone due to this surplus.
- Agriculture uses 85 per cent of the developed water supply in the state.
- Expansion of irrigated agriculture will depend upon the national and world food demand for the high priced California crops as much or more than available water supply. Developing a water supply does not automatically expand irrigation.
- Some politicians and several newspapers are not aware of the above.
- California's water supply is often developed for political mileage and emotional appeal.
- Winter pumping from the Delta with groundwater storage for future expansion would not require additional reservoirs and have little or no impact on the Delta system. Such a program should be given more attention as an alternative to the Peripheral Canal.

- Similarly, another offstream storage facility such as the San Luis Reservoir should be given more attention as an alternative to the Peripheral Canal.

- The chances of a recurrence of a critical dry year (1924) or a dry cycle (1928-34) in which there would be a "risk" (repeat a "risk") that project Delta export quality and quantity objectives would not be met is twice in any 100 years for the dry year and once in 200 years for the dry cycle.

- DWR has over-used the historic critical dry cycle (1928-34) in overselling the Peripheral Canal and other storage projects.

- The Bureau presently has 2 MAF of surplus storage; DWR should seek to recover the surplus from Metro before new SWP storage facilities are built; the predicted recurrence time between the critical dry cycle is much too long to build projects to meet demand during the dry cycle.

- The projects can meet their Delta export quality and quantity objectives for many years in the future without the Peripheral Canal.

Water Quality Management: The Institution

Historically the Bureau and DWR have had sole responsibility for water quality maintenance below the reservoirs. With few exceptions, this arrangement has been satisfactory due to the lack of demand for the developed supply. Several factors go into the sizing of a reservoir, the most important of which is anticipated future demand. Once the facility is constructed, there are several years in which the supply exceeds the demand, but over the years the demand should grow to match the supply.

Presently, both the CVP and SWP have a surplus of supply but the future portends, for them, a period when every acre foot must be accounted for and put to use.[881] When faced with the alternative of protecting the beneficial water uses in the Delta and exporting water from the Delta for traditional beneficial uses, the two agencies clearly chose the latter as expressed in the November 19, 1965 criteria.[882] Even the Secretary of the Interior noted the inadequacies of these criteria for the protection of striped bass and satisfying water rights in the western Delta.[883]

Departments and agencies often times have a "departmental bias" towards one set of objectives. Since 1902, the Bureau has been the arid land reclaimer in the 17 western states. Many worthwhile and beneficial projects including the CVP have been built and are now operated by this agency. The writer has expressed some personal reservations about the need and purpose of the SWP,[884] but DWR is also providing the state with a service. Both agencies view Delta outflows in D1379 as wasteful and both feel this water would best serve the state - or the projects - if it were spread on the land. This attitude reflects their departmental bias.

It may be pure conjecture but it appears that the third major actor in this thesis may have been created to counteract this bias.

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[881] The preceding discussion has raised serious questions about the actual supply and demand. Notice here we qualify the consideration here as the projects operators' opinion.

[882] See discussion in text between Ns. 590-602 Supra.

[883] See discussion in text between Ns. 615-616 and quote accompanying N. 617 Supra.

[884] See'State Water Project: Why?" section of this chapter.

As the Delta water quality control controversy began to gain momentum in the mid-sixties, the Legislature combined the management of water quality with the granting of water rights with the creation of the State Water Resources Control Board.[885] The powers of the State Board were enlarged with the passage of the Porter-Cologne Act in 1969. This act drew solely from the recommendations of a comprehensive study conducted by a task force of state engineers, private consultants and law makers.[886] Commissioned by the Legislature with water quality department bias, the State Board has set out to protect the beneficial water uses in the state by preserving and upgrading water quality through the nine regional water quality control boards and the issuance of water rights to all applicants for such a right.

Should the Bureau and DWR, by court order or otherwise, obey interim D1379 and the final decision on the Delta, they will have to alter the operation plans of the two projects.[887] Thus, there exists a classic institutional confrontation for the management of the resource. The water supply agencies, BOR and DWR, versus the water quality agency, the State Board.

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[885] See Fig. A-1 in Appendix A and Discussion in N. 613 Supra.

[886] State Water Resources Control Board Study Panel, Recommended Changes in Water Quality Control, Final Report, March, 1969. Of interest to note, the Chairman of the Study Panel that directed this study was Harvey O. Banks. See quotes in text accompanying Ns. 403, 404, 432, 433, 457.

[887] If the courts uphold D1379, DWR will have to obey the decision. See text accompanying N. 640 Supra. The Bureau's legal obeyance will depend upon the outcome of U.S. vs CA. Though this writer feels the Bureau will uphold interim D1379 or its subsequent any way. See discussion accompanying Ns. 677, and 645-646 Supra.

The implications of this confrontation are broader and more profound than the Delta water quality problem addressed in this thesis. Which agency should have the upper hand? Is it reasonable to expect a project financed by the federal treasury to submit to the authority of the state?

This study has not found the final answers to these questions but in the course of compiling this thesis, some ideas have slowly emerged. It appears that future struggles could, in most cases, be avoided if the developers would simply apply and receive a water right before they commence construction, or in the case of the Bureau, apply for congressional authorization. Such a process would add to the lead time of a project but it appears it would provide for the orderly distribution of the state's water resources.

The above suggestion includes the assumption the Bureau would honor any reasonable water right issued by the State Board. The key to such is the word reasonable. This study is concerned with the reservations expressed by the State Board in D1422 for the New Melones Reservoir. The State Board identified and assigned the reservoir the necessary outflows for downstream water quality maintenance. Also, the State Board reserved jurisdiction to increase the flows at any time in the future.[888] Such an open ended reservation does not allow the Bureau to identify the supply available for distribution. If, for example, the Bureau contracted all the supply, above that necessary to maintain the original downstream flow requirement, it would have to break delivery contracts to meet the upgraded demands by the Board. The only other alternatives would be to set aside a portion of the supply to meet this upgrading requirement or enlarge the reservoir if the stream can yield more storage supply. Both are extreme measures, water should be put to use, not put on hold; it is extremely costly to add height to a reservoir.[889]

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[888] See discussion accompanying N. 693 Supra.

The Bureau has a recourse to any State Board Decision it views as unreasonable. The decision could be placed before an impartial third party - the court. The threat of litigation would provide the necessary balance of departmental power; adjudication would provide the check.

The institutional discussion is summarized in the following points:

- Delta water quality levels independently developed and pledged to by the DWR and BOR are inadequate.
- The management of water rights and water quality in one agency, provides a reasonable and effective method for the orderly distribution of water resources.
- DWR and BOR should apply for a water right early in the planning process for a facility; BOR should secure a right prior to Congressional authorization.
- In the case of an unreasonable water right, decision by the State Board, the Bureau and DWR have a recourse in court.

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[889] See discussion in N. 82 Supra.

Bureau Participation: The First Step Towards a Solution

Blatently, DWR assumes in its Draft EIR: Peripheral Canal that the Bureau's participation in the Peripheral Canal will eventually be authorized by Congress. Should construction precede federal authorization, the assumption continues, the Bureau will pay DWR a utility charge for "wheeling" CVP water through the Canal.[890] These assumptions are overly generous. Four times authorizing bills have been introduced into Congress and each has faltered.[891] Congress shies away from projects that are not supported by the states in which they are to be built.[892] And while two major committees in the State Legislature and the former Governor Reagan have encouraged Congress to authorize the project,[893] the project is still very much a live issue as witnessed by the response to DWR's Draft EIR on the project.[894]

A few months after the issuance of the Draft EIR, Bureau Regional Director Martin told the State Senate, the Bureau would need Congressional authorization to enter into a Peripheral Canal "wheeling" agreement with DWR.[895] The forces that have prevented

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[890] See text accompanying N. 576 Supra.

[891] See text accompanying Ns. 568, 570, 573 Supra.

[892] Regional Director Billy E. Martin recently stressed this point before the Senate Committee on Agriculture and Water Resources. See text accompanying N. 645 Supra.

[893] See text accompanying N. 572 Supra.

[894] See text accompanying N. 883 Supra.

[895] See text accompanying N. 576 Supra.

Congressional authorization of the project will, no doubt, be as active in preventing the "wheeling" authorization.

Since most of the environmental assessments in the Draft EIR are made with the assumption that both projects will utilize the Canal, the assumptions may now be invalid. And the benefits of eliminating the Delta hydraulic stress from Delta pumping may be foregone.

Thus, the real question to the implementation of the physical solution, the Peripheral Canal, and the institutional solution, Delta water quality standards, is the future role of the Bureau of Reclamation. The opinion has been expressed that the Bureau will cooperate with the state in meeting Delta water quality objectives even if the courts rule the agency does not have to meet Delta water quality standards.[896] However, cooperation is not assurance and the negative impacts of the summer pumping will not be eliminated until both projects utilize the Canal.

Outlined in this chapter is a rather strong case that the Bureau has a moral and legal commitment to salinity control. Also, the view has been expressed that the Bureau will cooperate with the DWR and the waste dischargers in meeting Delta water quality objectives. If the agency would officially commit the project to the nondegradation of federal and state Delta water quality objectives and if this commitment were written into the next bill for Peripheral

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[896] See discussion in text between Ns. 640-646 Supra.

Canal authorization,[897] the chances for the authorization and the Delta would be greatly improved.

OUTLOOK

While this thesis is not designed to forecast the future of the Delta, it does seem appropriate in these closing pages to indicate the best guess. Alternatives that will control the future may be reasonably identified, however, the final outcome rests heavily on court proceedings now in progress. There is no doubt that the major case, U.S. vs. California will only be resolved in the highest court; thus, this case and the Delta question will be unresolved for several years.[898]

Alternatives

There are nine basic alternative factors that can be combined into 36 different permutations or alternatives. The alternative factors are arranged into four different sets of actions and each factor is given an identifying letter or number for illustrating the various possible futures:

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[897] DWR has drafted a comprehensive bill for federal authorization of the Peripheral Canal. Dave Kennedy, Metropolitan Water District of Southern California, testimony State Senate Hearings Statewide Water Supply and Demand.

[898] Some predict as many as 15 years. See text accompanying N. 725 Supra. See the District Court's ruling on p. 385 Supra.

Set 1: Peripheral Canal

1. Both Projects Participate in the Peripheral Canal
2. State Only Peripheral Canal
3. No Peripheral Canal

Set 2: United States vs. California

A. State Board's Authority to condition Bureau's water right upheld

B. State Board's Authority to condition Bureau's water right not upheld

Set 3: Central Valley East Side Project Association vs. State Board

I. D1379 standards upheld

II. D1379 standards not upheld

Set 4: Basin Plan Water Quality Objectives

X. Objectives Ruling on both Projects

Y. Objectives Ruling on State Project only

Z. Objectives not ruling

Utilizing the above alternative future factors, the following 36 alternatives were developed:

1AIX
1AIY
1AIZ
1AIIX
1AIIY
1AIIZ
1BIX
1BIY
1BIZ
1BIIX
1BIIY
1BIIZ

2AIX
2AIY
2AIZ
2AIIX
2AIIY
2AIIZ
2BIX
2BIY
2BIZ
2BIIX
2BIIY
2BIIZ

3AIX
3AIY
3AIZ
3AIIX
3AIIY
3AIIZ
3BIX
3BIY
2BIZ
3BIIX
3BIIY
3BIIZ

Since many of these 36 alternatives would have the same impact on the projects and the Delta, and the consideration of all would add complexity to the exercise, only the impacts of the alternatives from the first three sets are uses. Significant alternatives with the alternative factors of the fourth set are discussed below. Figure 19 presents the impacts of the alternatives developed with the first three sets of alternative factors plus the following assumptions:

- D1379 outflows with Peripheral Canal less than present outflows.
- No recurrence of critical dry period.
- CVP has a surplus of water, SWP does not.
- With Peripheral Canal and no D1379, both projects can meet demands without additional supply.
- With Peripheral Canal and D1379, SWP only will need additional supply.
- With Peripheral Canal and D1379, both projects can meet demands without additional supply.
- With SWP only Peripheral Canal and no D1379, both projects can meet demands without additional supply.
- With SWP only Peripheral Canal and D1379, SWP only will need additional supply.
- With no Peripheral Canal, D1379 or no D1379, CVP only can meet Delta export quality demands.
- With no Peripheral Canal, D1379 or no D1379, both projects will need additional supply.

For the sake of brevity, the fourth set of alternatives are not considered in Figure 19. If this set had been added, the number of alternatives to consider would be enlarged from 12 to the full 36. The general impacts of these alternatives may be matched against

FIGURE 19
IMPACTS OF MAJOR ALTERNATIVES

ALTERNATIVES			DELTA					PROJECTS										
			Water Quality - maintained	Water Quality - may not be maintained	Ecology - beneficial	Ecology - generally beneficial	Ecology - negative	both - export water quality objectives met	CVP only - export water quality objectives met	both - export water quality objectives met	CVP only - export water quality objectives met	salvage outflows above D1379 outflows	SWP only - salvage outflows above D1379 outflows	both - salvage substantial outflows	SWP only - salvage substantial outflows	CVP only - salvage substantial outflows	both - more supply needed	SWP only - more upstream storage needed
1	A	I	X		X			X		X		X						X
1	A	II		X			X	X		X				X				
1	B	I	X		X			X		X		X		X		X		X
1	B	II		X			X	X		X				X				
2	A	I	X			X		X		X		X						
2	A	II		X			X	X		X					X			
2	B	I	X			X		X		X			X					X
2	B	II		X			X	X		X				X	X			
3	A	I	X				?		X		X						X	
3	A	II	X				?		X		X						X	
3	B	I	X				?		X		X						X	
3	B	II	X				?		X		X						X	

All decisions involve a certain amount of judgement. Assumptions are presented in the text.

similar alternatives in Figure 19. For example, the Basin Plan objectives are virtually the same as the D1379 standards so that X could be substituted for I in the list of alternatives considered; Y could replace BI, and Z would have the same impact as II. However, the sacrifice made in not including the fourth set is that some of these alternatives may override negative impacts of the second and third case. For example, the negative impacts of reduces outflows with alternative factor II (D1379 standards not upheld) may be overturned by alternatives with factors X or Y. Thus the X and Y alternative factors are very significant in this discussion but, again, they are not considered in the interest of brevity.

Best Guess

- The Peripheral Canal will be built to:
    1) reduce the negative impact of pumping from the Delta in the summer
    2) salvage outflows above those needed for interim D1379 or the final Delta Decision.
    3) protect and enhance the quality of the project export water quality.
- Water quality equivalent to the D1379 standards or subsequent final Delta Decision standards will be maintained by both projects.
- The overland supply may be built only if the present *Neomysis* standard is reduced in the final Delta Decision.
- If the *Neomysis* standard in interim D1379 is reduced in the final Decision, the resultant standard will be adequate to protect this beneficial use.

With so many undefined factors yet to fall in place, the only certainty is uncertainty. Thus, the above represents a compact future forecast of not only what it appears may happen but also what is hoped will happen. Mixed feelings are held over the U.S. vs. California outcome, but the opinion is expressed elsewhere that the Delta outflows will be maintained anyway because as a state agency DWR must maintain them and the Bureau will maintain them for public support.[899] Public support is very valuable to the Bureau. Approximately half of the California delegation in the House of Representatives and both Senators are from Southern California (south of the Tehachapi Mts.). This is the region in which the Metropolitan Water District of Southern California, the largest customer of the SWP is located. These gentlemen are very sensitive to the hardships that would be placed on their constituents if the SWP has to maintain the D1379 outflows alone. Annual allocations in Congress to the Bureau for studies and plans as well as possible future projects could be jeopardized if the Bureau chose to defy D1379. This study advocates a rather strong case that the agency should not only provide Delta water quality but it has a moral and legal commitment to do so as well.

Water is a res-cummunes resource - common to all and property of none. Appropriators sometimes consume the resource, but they are obligated by law to use a reasonable amount for a reasonable purpose and return as much as reasonably possible to the supply for other diverters. The projects should be operated to benefit people not land. In the main, the project's operators determine the degree and area of benefit that is to be derived from the control and redistribution of the state's water supply. Yet the operators are not autonomous, a measure of accountability is injected when they go before Congress for appropriations, before the State Water Resources Control Board for a water right, and before citizens at large through the Environmental Impact Statement and Environmental Impact Report process. This thesis has been dedicated to the goal of enhancing this degree of accountability.

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[899] See Bureau Participation discussion Supra.

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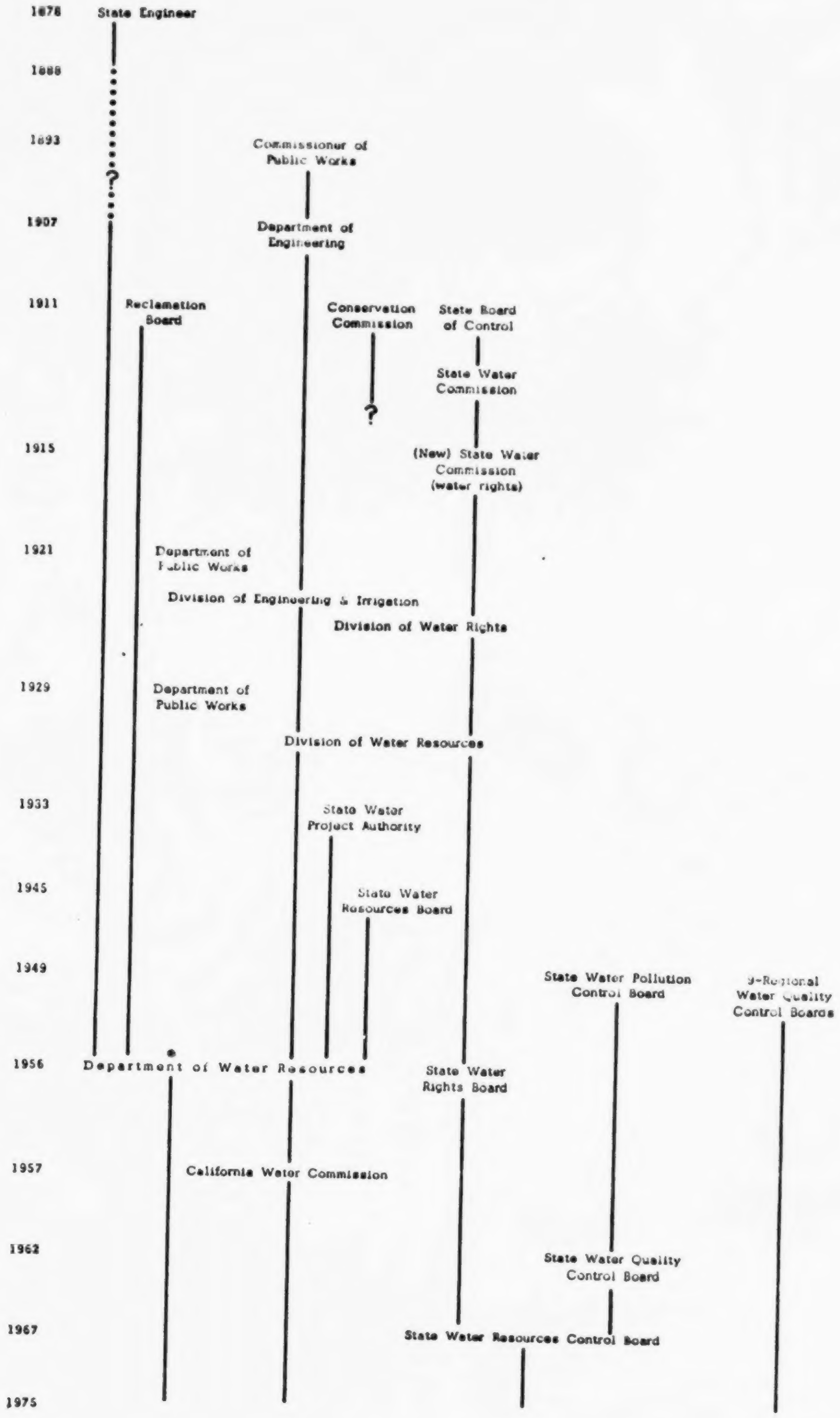
FIGURE A-1 CALIFORNIA WATER MANAGEMENT


1878
State Engineer
1888
1893
Commissioner of Public Works
?
1907
Department of Engineering
1911
Reclamation Board
Conservation Commission
State Board of Control
State Water Commission
?
1915
(New) State Water Commission (water rights)
1921
Department of Public Works
Division of Engineering & Irrigation
Division of Water Rights
1929
Department of Public Works
Division of Water Resources
1933
State Water Project Authority
1945
State Water Resources Board
1949
State Water Pollution Control Board
9-Regional Water Quality Control Boards
1956
Department of Water Resources
State Water Rights Board
1957
California Water Commission
1962
State Water Quality Control Board
1967
State Water Resources Control Board
1975

APPENDIX B

DELTA WATER QUALITY CRITERIA, OBJECTIVES, STANDARDS

APPENDIX B

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Bureau of Reclamation
Department of Water Resources
San Joaquin Water Rights Committee
Sacramento River and Delta Water
Association

November 19, 1965

DELTA WATER QUALITY CRITERIA

A. Delta Area: Delta area will include both Delta lowlands and Delta uplands and may include as much but no more than the area described in Section 12220 of the Water Code of the State of California.

B. General Objectives: The general objectives of these criteria are as follows:

1. To protect the Western Delta channels against the intrusion of ocean salinity.

2. To provide water of suitable quality in the interior Delta channels acceptable for the contemplated uses.

C. Definitions: The definitions of certain terms used in these criteria are as follows:

1. "Critical year" shall mean any year in which either of the following eventualities exists:

a. The forecasted full natural inflow to Shasta Lake for the current water year (October 1 of the preceding calendar year through September 30 of the current calendar year) is equal to or less than 3,200,000 acre-feet; or

b. The total accumulated actual deficiencies below 4,000,000 acre-feet in the immediately prior

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water year or series of successive prior water years each of which had inflows of less than 4,000,000 acre-feet, together with the forecasted deficiency for the current water year, exceed 800,000 acre-feet.

2. "Dry year" shall mean any year other than a critical year in which the forecasted full natural inflow to Shasta Lake for the current water year is equal to or less than 4,000,000 acre-feet.

3. "Below normal year" shall mean any year in which the forecasted full natural inflow to Shasta Lake for the current water year is equal to or less than 4,500,000 acre-feet but more than 4,000,000 acre-feet.

4. "Full natural inflow to Shasta Lake" shall mean the computed inflow to Shasta Lake under present water development above Shasta Lake. In the event that a major water project is completed above Shasta Lake after September 1, 1963, which materially alters the present regimen of the stream systems contributing to Shasta Lake, the computed inflow to Shasta Lake will be adjusted to eliminate the effect of such water project. After consultation with the State, the Weather Bureau, and other recognized forecasting agencies, the U. S. Bureau of Reclamation will select the forecast to be used and will make the details of it available to the Delta water users. The same forecasts used by the United States for the operation of the Central Valley Project shall be used

to make the forecasts under this agreement. Such forecasts shall be made by February 15 of each year and may be revised as frequently thereafter as conditions and information warrant.

D. Quality Criteria: The quality criteria for water in the channels of the Delta required to satisfy the general objectives set forth in Article B are as follows:

1. At Jersey Point in San Joaquin River and at Emmaton (southwest end of Horseshoe Bend) in Sacramento River, a mean daily chloride content of 1,000 parts per million or less when measured on the basis of the average mean daily value for any 10 consecutive days, except that after August 1 of a critical year and until December 31 of the same calendar year, the quality criteria set forth above may be increased from 1,000 parts per million to 1,400 parts per million of chloride.

2. At Jersey Point in San Joaquin River and at Emmaton in Sacramento River, an average mean daily chloride content of 200 parts per million or less for a period of at least 10 consecutive days each year at some time during the period between April 1 and May 31, except in dry or critical years.

3. At Terminous in Little Potato Slough, at Rio Vista in Sacramento River, at San Andreas Landing in San

Joaquin River, at Clifton Court Ferry in Old River, and after the initial operation of the Peripheral Canal, at the Bifurcation of Middle River and Old River.

a. A mean daily total dissolved solids content of 700 parts per million or less when measured on the basis of the average mean daily value for any 10 consecutive days,

b. A mean monthly total dissolved solids content of 500 parts per million or less when measured on the basis of the average mean daily value for any calendar month,

c. A mean annual total dissolved solids content of 450 parts per million or less when measured on the basis of the average mean daily value for any calendar year.

4. After April 1 in a dry or critical year and after August 1 in a below normal year and until December 31 of the same calendar year, the total dissolved solids criteria specified in Article D, Part 3, may reach, but not exceed, 800 parts per million for item a, 600 parts per million for item b, and 500 parts per million for item c; provided, however, the average of the values of the total dissolved solids content at all of the named locations shall not exceed, for the balance of the calendar year, the mean values specified in Article D, Part 3.

5. Whenever the recorded total dissolved solids content in Sacramento River at Green's Landing exceeds a mean 10-day or a mean monthly value of 150 parts per million, the quality criteria in Article D, Parts 3 and 4 may be changed by adding to those values the product of 1-1/2 times the amount by which the recorded total dissolved solids content at Green's Landing exceeds 150.

E. Conditions Permitting Change of Location of Control Stations at Emmaton and Jersey Point: After 1980, the locations of the control stations at Emmaton and Jersey Point may be moved upstream to, but not beyond, (1) the south end of Threemile Slough in San Joaquin River and (2) the north end of Threemile Slough in Sacramento River and substitute water facilities provided for the area affected by such move, if the parties agree that operating experience indicates that the water quality criteria in Article D, Part 1 will create undue hardship to the operators of the State or Federal projects, and agree upon terms and conditions as may be authorized by law and mutually agreeable to the parties at that time; provided, however, nothing in this agreement shall be construed to waive whatever rights the project operators may otherwise have to provide in the public interest a substitute water supply in lieu of the water supply provided by these criteria subject to applicable law including the obligations of the State under Sections 12200-12205 of the Water Code.

After 1980, if operating experience indicates that the water quality criteria specified in Article D is creating undue hardship to the Delta water users, the quality of the water may be improved if the parties so agree, and then upon such terms and conditions as may be mutually agreeable to the parties.

F. Peripheral Canal and Other Projects: The proposed Peripheral Canal, and any other projects of the United States or the State of California, will be operated in such a manner so as not to violate the foregoing objectives. Flows in Sacramento River and releases from Peripheral Canal into Delta channels will be in such quantities and at such locations as will provide the best quality of water over the Delta as a whole and specifically not less than the quality provided in Article D.

G. New Melones: In the event New Melones Reservoir on Stanislaus River is operated to provide water quality control, the quality of the water in San Joaquin River at Vernalis will be maintained at 500 parts per million of total dissolved solids content or less, when measured on the basis of the average mean daily value for any 30 consecutive days, provided that not more than 70,000 acre-feet shall be released from New Melones Reservoir in any one calendar year specifically for water quality, in addition to the water released for fishery and other purposes and downstream prior rights.

STATE WATER RESOURCES CONTROL BOARD

RESOLUTION NO. 68-17

ADOPTING SUPPLEMENTAL WATER QUALITY CONTROL POLICY FOR SACRAMENTO-SAN JOAQUIN DELTA

WHEREAS:

1. On June 14, 1967, the former State Water Quality Control Board adopted water quality control policy for the Sacramento-San Joaquin Delta. On June 23, 1967, this and other policies for California's interstate and coastal waters were submitted to the Secretary of the Interior as proposed federal water pollution control standards pursuant to the provisions of the Federal Water Pollution Control Act.

2. After reviewing these policies, the Federal Water Pollution Control Administration regional staff advised this Board that in its opinion the water quality criteria in the Sacramento-San Joaquin Delta policy does not adequately protect all of the beneficial uses identified in that policy. This regional staff has offered for consideration of the Board "Proposed Supplemental Delta Water Quality Standards for Chloride and Total Dissolved Solids Concentration", which contains additional criteria that have been developed within the Department of the Interior.

3. All but two of the proposed supplemental standards are similar to Delta water quality criteria approved November 19, 1965, by representatives of the United States Bureau of Reclamation, California Department of Water Resources, Sacramento River Delta Water Association and San Joaquin Water Rights Committee, as an appropriate basis for further negotiations leading to agreements between Delta interests and the operators of federal and state projects.

4. The former State Water Rights Board approved applications of the Department of Water Resources for the appropriation of water of the Feather River and Delta subject to the November 19, 1965, Delta water quality criteria, but said Board concluded after lengthy hearings that sufficient information was not available to finally determine what further requirements should be imposed, and said Board reserved jurisdiction over the permits for the purpose of formulating and revising terms and conditions relative to salinity control in the Delta, with the provision that prior to June 30, 1970,

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the Board will "hear, review and make such further order relative to salinity control as may be required." A reservation of jurisdiction was also included in permits issued to the United States Bureau of Reclamation to appropriate water of the Sacramento River and Delta. The Board now intends to hold such further hearings during the year 1969.

5. Maintenance of desirable salinity objectives in the Delta is dependent upon the manner in which the federal and state water projects are operated pursuant to their respective water right permits. For this reason water quality and water rights in the Delta are completely interrelated, it being impossible to properly consider one without the other.

6. In the past, negotiations between the United States Bureau of Reclamation and the Department of Water Resources with Delta interests have been hampered by lack of an agency authorized to represent the landowners and water users. In 1968 the California Legislature created the Delta Water Agency with power to contract with the United States and the State for the purpose of protecting water in the Delta against intrusion of ocean salinity and assuring lands in the Delta a dependable water supply of suitable quality to meet present and future needs. The law creating this agency will take effect in November 1968.

7. In 1965 the California Legislature authorized a special study of a comprehensive master plan for control of water pollution in the San Francisco Bay and Sacramento-San Joaquin Delta. A report of this study will be submitted to the Legislature in the spring of 1969.

NOW, THEREFORE, BE IT RESOLVED:

1. Adoption of salinity objectives for the western Delta should be coordinated with the terms of water right permits of the United States Bureau of Reclamation and the California Department of Water Resources and only those objectives which are consistent with said permit terms should be adopted at this time.

2. The water quality objectives contained in the attached "Supplemental Water Quality Control Policy for Sacramento-San Joaquin Delta" are the same as Articles C and D of the "November 19, 1965, Delta water criteria." Said policy is adopted as an addition to the "Water Quality Control Policy for Sacramento-San Joaquin Delta" which was adopted by the former State Water Quality Control Board on June 14, 1967.

3. Additional water quality objectives for the Delta will be considered after further water right hearings are conducted by this Board in 1969.

4. A copy of this resolution shall be forwarded to the Secretary of the Interior as part of California's water quality control policy submission.

Attachment

CERTIFICATION

The undersigned, Executive Officer of the State Water Resources Control Board, does hereby certify that the foregoing is a full, true, and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on October 24, 1968.

Dated: October 28, 1968

Kerry W. Mulligan
Executive Officer
State Water Resources
Control Board

SUPPLEMENTAL WATER QUALITY CONTROL POLICY FOR SACRAMENTO-SAN JOAQUIN DELTA

A. Definitions: [See November 19 Criteria Definitions Supra]

B. Water Quality Objectives:

1. At Jersey Point in the San Joaquin River and at Emmaton (southwest end of Horseshoe Bend) in the Sacramento River, a mean daily chloride content of 1,000 parts per million or less when measured on the basis of the average mean daily value for any 10 consecutive days, except that after August 1 of a critical year and until December 31 of the same calendar year, the quality criteria set forth above may be increased from 1,000 parts per million to 1,400 parts per million of chloride.

2. At Jersey Point in the San Joaquin River and at Emmaton in the Sacramento River, an average mean daily chloride content of 200 parts per million or less for a period of at least 10 consecutive days each year at sometime during the period between April 1 and May 31, except in dry or critical years.

3. At Terminous in Little Potato Slough, at Rio Vista in the Sacramento River, at San Andreas Landing in the San Joaquin River, at Clifton Court Ferry in Old River, and after the initial operation of the Peripheral Canal, at the bifurcation of Middle River and Old River,

   a. A mean daily total dissolved solids content of 700 parts per million or less when measured on the basis of the average mean daily value for any 10 consecutive days,

   b. A mean monthly total dissolved solids content of 500 parts per million or less when measured on the basis of the average mean daily value for any calendar month,

   c. A mean annual total dissolved solids content of 450 parts per million or less when measured on the basis of the average mean daily value for any calendar year.

4. After April 1 in a dry or critical year and after August 1 in a below normal year and until December 31 of the same

calendar year, the total dissolved solids criteria specified in Article B, Part 3, may reach, but not exceed, 800 parts per million for item a, 600 parts per million for item b, and 500 parts per million for item c; provided, however, the average of the values of the total dissolved solids content at all of the named locations shall not exceed, for the balance of the calendar year, the mean values specified in Article B, Part 3.

5. Whenever the recorded total dissolved solids content in the Sacramento River at Green's Landing exceeds a mean 10-day or a mean monthly value of 150 parts per million, the quality criteria in Article B, Parts 3 and 4, may be changed by adding to those values the product of 1-1/2 times the amount by which the recorded total dissolved solids content at Green's Landing exceeds 150.

C. Implementation

The implementation of these objectives shall be obtained through the conditioning of water right permits issued to the United States Bureau of Reclamation and the California Department of Water Resources for projects affecting the Delta.

DECISION 1379

July 28, 1971

State Water Resources Control Board

B-15

Since Decision 1379 is over sixty pages in length only the water quality standards are included here. On September 10, 1971 the Board issued an Order Denying Reconsideration of and Clarifying and Correcting D1379. The following incorporates the changes made therein.

State Delta Standards

The stations referred to herein will be abbreviated as follows: Old River at Clifton Court Ferry, CCF; Rock Slough at Contra Costa Canal Intake, CCI; San Joaquin River at Jersey Point, Jersey; Sacramento River at Emmaton, Emmaton; South Fork Mokelumne River near Terminous, Terminous; Sacramento River at Rio Vista, Rio Vista; San Joaquin River at San Andreas Landing, SAL; and San Joaquin River at Antioch, Antioch.

A. Standards for Protection of Agricultural Uses

			Months	
1. Station	Cl^- & TDS Criteria	Type of Year	AMJJ	ASOND
Blind Point*	Running Average of mean daily for any 14 consecutive days:			
	(TDS) EC maximum millimhos	non-critical	2	3.6
	(Cl^-) maximum, mg/l	non-critical	350	1000
	(TDS) EC maximum millimhos	critical	3	3.6
	(Cl^-) maximum, mg/l	critical	1000	1000
Jersey & Emmaton	Average of mean daily Cl^- content for at least 10 consecutive days between April 1 and May 31 maximum 200 mg/l	normal and below normal		

---

* Jersey and Emmaton will be substituted for Blind Point when an overland supply is provided to existing irrigation uses on Sherman and Jersey Islands and Hotchkiss Tract.

2. Station		Type of Year	JFM	AMJJ	ASOND
			EC--maximum millimhos		
Terminous Rio Vista SAL CCF	Running average of mean daily for any consecutive 14 days	normal or above	1.25	1.25	1.25
		below normal	1.25	1.25	1.40*
		dry or critical	1.25	1.40*	1.40*
	Average of mean daily for any calendar month	normal or above	0.88	0.88	0.88
		below normal	0.88	0.88	1.05*
		dry or critical	0.88	1.05*	1.05*
	Average of mean daily for any calendar year	normal or above	0.80	0.80	0.80
		below normal	0.80	0.80	0.88*
		dry or critical	0.80	0.88*	0.88*

* The EC value at any of these 4 stations may reach, but not exceed the starred value shown, but the average of the EC value at the 4 stations shall not exceed the adjacent unstarred value.

Criteria Adjustment: Whenever the recorded EC in Sacramento River at Green's Landing exceeds a running average 14-day or a mean monthly value of 0.240 millimhos, the maximum values for Terminous, Rio Vista, SAL and CCF may be increased by adding 1-1/2 times the amount by which the recorded EC at Green's Landing exceeds 0.240 millimhos.

B. Standards for Protection of Industrial and Municipal Uses

1. Station		EC--Millimhos	Cl^- Maximum mg/l
CCCI	Mean tidal cycle value	1.32	250
	MTC value at least 65% of any year	0.67	100

2. Station		Type of Year	No. of days
Antioch**	Average of mean daily Cl^- for any 14 consecutive days shall not exceed 450 mg/l	normal below normal	150
		dry	120
		critical	100

** These requirements will be terminated when existing industrial and municipal uses are fully supplied by an overland supply.

Definitions

[See Definitions in November 19, 1965 Criteria Supra)

C. Standards for Protection of Fish and Wildlife

1. Standards for striped bass

   a. For five weeks after the water temperature at Antioch reaches 60°F the mean daily salinities in the San Joaquin River at the Antioch Water Works Intake and at Prisoners Point shall not exceed 1,500 micromhos and 550 micromhos, (approximately 1,000 and 350 mg/l TDS) respectively.

   b. Export pumping shall be minimized for a five (5) week period from April 25 through May 31 of each year during the peak of striped bass spawning. Permittees shall file with the State Water Resources Control Board by April 15 of each year the proposed schedule of pumping during the immediately following said 5-week period.

   c. A mean daily chloride concentration of 4,000 mg/l or less at Chipps Island shall be maintained for Neomysis.

2. Standards for Salmon

   a. There shall be a positive downstream flow in all principal channels of the Sacramento-San Joaquin Delta including the Sacramento below the proposed Peripheral Canal Intake and the San Joaquin River from the head of Old River to Antioch.

b. There shall be a sufficient supply of water of San Joaquin origin, via the natural channel of the San Joaquin River, to produce and maintain a predominance of San Joaquin River water in the southern and eastern portion of the Delta from September 1 through November 30.

c. Project facilities shall be designed, constructed, and operated to minimize interference with downstream migrant salmon and steelhead and reasonable measures undertaken to salvage those diverted by project works. For purposes of definition, a reasonable objective is to salvage 95% of the salmon and steelhead approaching salvage facilities.

3. Standards for Suisun Marsh

a. There shall be available by February 1 of each year, water sufficient in quantity and quality so as to produce under reasonable management practices, between April 15 and June 1 of each year, an average salinity of 9,000 mg/l TDS in the first 12 inches of soil.

b. The mean monthly salinity of the natural channels and the bay surrounding and adjacent to the marsh shall not exceed 18,000 mg/l TDS until a suitable alternative water supply is provided.

3. Upon request to and approval of the Board, variations in flow for experimental purposes for protection and enhancement of fish and wildlife may be allowed provided that they do not cause violation of Paragraphs A and B of the State Delta Standards.

4. Permittees shall independently or in cooperation with other agencies or individuals install and operate water quality monitoring stations at the locations shown on Plate 1 and identified in Table 2, monitor the parameters specified in Tables 3 and 4, with the frequency specified in Table 3, and shall submit monthly reports showing the results of such monitoring to the State Water Resources Control Board as soon as practicable following the month during which the monitoring was accomplished. Permittees should also provide the Board with monthly reports of any other Delta monitoring accomplished by them.

5. Permittees shall conduct quarterly synoptic monitoring by aerial surveillance and report the results to the State Water Resources Control Board as soon as practicable until further order of the Board.

6. The Delta monitoring program as set forth in Tables 2, 3 and 4 will be subject to continuing review. Any party to this proceeding may for good cause petition the Board, and the Board on its own motion after evaluation of the results of required monitoring may take action to adjust the monitoring program. Such action may be taken only after notice to all parties and allowance of opportunity for objection.

7. Permittees shall conduct a continuing study regarding temperature, velocity, scour, dissolved oxygen, algal growth, turbidity and productivity in those reaches of the Sacramento and San Joaquin Rivers which are susceptible of control by providing

inflow to the Delta. Permittees shall provide a progress report on said studies to the State Water Resources Control Board not later than August 1, 1973.

8. Should conditions arise which would warrant earlier consideration, or if it appears that the parties are not negotiating in good faith for necessary water service contracts the Delta water rights hearing will immediately be reopened. In any event, not later than July 1, 1978, the State Water Resources Control Board shall reopen the hearing for the purpose of receiving further evidence relating to salinity control, protection of fish and wildlife in the Delta, and coordination of terms and conditions of the permits involved in this decision with terms and conditions arising in subsequent decisions concerning the Delta.

9. The Board terminates the reservation of jurisdiction for:

   (a) the purpose of formulating terms and conditions relative to salinity control in the Sacramento-San Joaquin Delta in connection with the permit issued pursuant to Application 10588 (Keswick) and the reservation of jurisdiction for the purpose of coordinating terms and conditions of the permit issued to Application 10588 with other permits in furtherance of the Central Valley Project and State Water Project contained in Decision D 990.

   (b) the purpose of reviewing the Oroville-Thermalito power sales contract and making such revisions in the permit terms as may be appropriate in the permits issued or to be issued pursuant to Applications 5629, 5630, 14443, 14444, 14445A, 17512 and 17514A, contained in Decision 1291.

(c) for the purpose of conforming the season of diversion under permits issued or to be issued pursuant to Applications 18721, 18723, 21636 and 21637 to later findings on prior applications involving water in the Sacramento River Basin and Delta contained in Decision 1356.

10. Conditions relating to salinity control in the Delta in any of the prior decisions involved herein are rescinded.

Adopted as the decision and order of the State Water Resources Control Board at a meeting duly called and held at Sacramento, California.

Dated: July 28, 1971

Kerry W. Mulligan, Chairman

*
E. F. Dibble, Vice Chairman

Norman B. Hume, Member

Ronald B. Robie, Member

W. W. Adams, Member

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*Subject to the attached exceptions and qualifications.

STATE WATER RESOURCES CONTROL BOARD
RESOLUTION NO. 73-16

WATER QUALITY CONTROL PLAN SUPPLEMENTING STATE WATER QUALITY CONTROL POLICY FOR SACRAMENTO-SAN JOAQUIN DELTA

WHEREAS:

1. The waters in the Sacramento-San Joaquin Delta are waters for which water quality standards are required by the Federal Water Pollution Control Act and acts amendatory thereof or supplementary thereto, including the Federal Water Pollution Control Act amendments of 1972.

2. The former State Water Quality Control Board on June 14, 1967, adopted State Water Quality Control Policy for Sacramento-San Joaquin Delta which included water quality objectives (standards) for the protection of beneficial uses of water.

3. The State Water Resources Control Board on October 24, 1968, adopted a Supplemental Water Quality Control Policy for Sacramento-San Joaquin Delta which included additional objectives. Said Policy did not contain certain salinity objectives that had been recommended by the Federal Water Pollution Control Administration for the protection of striped bass and other beneficial uses of water in the Western Delta because sufficient information was not then available to prescribe such objectives. Approval of the supplemental Policy by the Secretary of the Interior (as was then required by the Federal Water Pollution Control Act) was conditioned on the Board's commitment to adopt additional salinity objectives when sufficient information became available.

4. On December 20, 1972 the Board held a public hearing at which time comments and information were received concerning proposed salinity objectives for the protection of striped bass and other beneficial uses of water in the Western Delta.

5. The Board, after consideration of the information received at and subsequent to said hearing, and having considered the factors specified in Water Code Section 13241 and other factors relevant to the establishment of water quality objectives, finds that the establishment of supplemental water quality objectives is necessary to ensure the reasonable protection of beneficial uses of water in the Sacramento-San Joaquin Delta.

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NOW, THEREFORE, BE IT RESOLVED that the "Water Quality Control Plan Supplementing State Water Quality Control Policy for Sacramento-San Joaquin Delta" is hereby adopted.

CERTIFICATION

The undersigned, Executive Officer of the State Water Resources Control Board, does hereby certify that the foregoing is a full, true and correct copy of a resolution duly and regularly adopted at a meeting of the State Water Resources Control Board held on April 19, 1973.

Bill B. Dendy
Executive Officer

SUPPLEMENTAL WATER QUALITY OBJECTIVES
FOR
SACRAMENTO-SAN JOAQUIN DELTA

A. Definitions [See November 19 Criteria Definitions Supra]

B. Water Quality Objectives

1. At Antioch in the San Joaquin River, the average of mean daily total dissolved solids for any 14 consecutive days shall not exceed 450 milligrams per liter (Mg/l) throughout a period of at least 150 days in each normal or below normal water year; provided, however, that the period is reduced to 120 days during dry water years and 100 days during critical water years. These objectives will be terminated when existing industrial and municipal uses are fully supplied by an overland supply.

2. For five weeks after the water temperature at Antioch reaches 60 degrees, the 14-day running average of mean daily salinities in the San Joaquin River at the Antioch Water Works Intake and at Prisoners Point shall not exceed 1,500 micromhos and 550 micromhos (approximately 1,000 and 350 milligrams per liter total dissolved solids) respectively.

Implementation

These objectives will be implemented by surveillance and monitoring programs and the terms in permits issued by the State Water Resources Control Board for appropriation of water of the Sacramento-San Joaquin Delta and its tributaries.

APPENDIX C

LETTERS

APPENDIX C

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U.S. Bureau of Reclamation Regional
Director C. H. Spencer to Harvey O.
Banks Director, California Department
of Water Resources

July 10, 1957

C-5

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UNITED STATES
DEPARTMENT OF THE INTERIOR
Bureau of Reclamation
Sacramento, California

July 10, 1957

Mr. Harvey O. Banks, Director
State of California
Department of Water Resources
Sacramento, California

Mr. Clair A. Hill, Chairman
State Water Board
P.O. Box 1592
Sacramento, California

Gentlemen:

In your "Joint Notice of Public Hearing" dated June 10 you requested written comments on Bulletin No. 60, dated March 1957, entitled "Salinity Control Barrier Investigation." I am pleased to respond to your invitation. In so doing, I wish to note that this office has not investigated salt water barriers in any comprehensive way, nor have we made a detailed review and analysis of Bulletin No. 60.

The basic assumption underlying Bulletin No. 60 is stated on page 25 as follows:

> "*The current study of salinity control barriers is based upon the premise that salinity is being controlled by the Central Valley Project at the point near Antioch shown in Figure 2* (approximately 2 miles downstream of Antioch), *and that this is being accomplished by a minimum fresh water flow to Suisun Bay of 3,800 second-feet, consisting of 3,300 second-feet of surface inflow from the Sacramento and/or San Joaquin Rivers and 500 second-feet of accretion in the Delta.*" (Italics in original text.)

The stated premise is not an accurate reflection of operations of the Central Valley Project. Moreover, such an operation would be highly adverse to the public interest in that it would require an unjustified waste of water sorely needed in the Sacramento and San Joaquin Valleys. Since conditions under barrier operation are compared with conditions at present in Bulletin No. 60, I invite your serious consideration to the above-quoted premise in any further action taken on the proposed barrier.

Shasta Dam and Reservoir began to augment summer inflows to the Sacramento-San Joaquin Delta in June 1944. Folsom Dam and Reservoir were first operated for this purpose in the summer of 1955. Since the winter of 1943-44, the nearly 400,000 acres of the Delta have been protected against incursion of water having maximum surface zone salinity of 1,000 parts per million except for approximately 32,000 acres in two years, 20,000 acres in two years, and 10,000 acres or less in the other nine years. This is indeed a high degree of salinity control.

During the first few years of Project operation, a computed outflow of 3,300 second-feet was used as a criteria of Project operations. This target flow was based on information available prior to 1945--primarily the excellent analyses set forth in Bulletin No. 27 of the State Division of Water Resources. On page 221 this Bulletin summarizes the problems of place and degree of salinity control as follows:

> "The point and degree of control of salinity by stream flow must be based primarily upon a consideration of the needs of the agricultural interests in the delta and the industrial, municipal and agricultural interests in the upper bay region. It would be desirable to adopt such measures of control as would most effectively *and, at the same time, most economically* provide for the present and ultimate needs of these water users. *At the same time, consideration must be given to the general plan for the development and utilization of the State's water resources and the amount of additional water supplies created thereby in relation to the needs not only of the delta and upper bay region but also of the Sacramento and San Joaquin valleys. Finally consideration must be given also to the practical limit of control which is possible of attainment by means of stream flow.*" (Emphasis applied).

Since initial operation of the Delta Cross Channel in 1952, we have experimented constantly to find the Delta outflow which will be effective, economical, and appropriate to the general plan for development and utilization of the State's water resources--all as contemplated in Bulletin 27.

The experience we have had to date is not adequate to fix precisely the necessary outflow for salinity control. It appears that, under present conditions of upstream development and diversions from the Delta, a computed outflow of approximately 1,500 second-feet will protect the intakes to the Tracy and Contra Costa pumping plants. At the same time, this outflow will protect 95% of the land and water area of the Delta against incursion of highly saline water from Suisun Bay. Bulletin No. 60 assumes that a barrier plan will conserve 2,600 second-feet of water. We consider this unrealistic, for it presupposes that at present some 1,800 second-feet of water is used to protect the lower 20,000 acres in the Delta. No sound plan for the conservation of waters of this State can contemplate a duty of water of this magnitude.

The discussion on page 24 of Bulletin No. 60 might be construed as implying that the Central Valley Project is obligated legally to control salinity to a certain standard at a point near Antioch. In particular, the reference to House Document No. 146, 80th Congress, 1st Session, carries this implication. Such an assumption as to the legal obligation of the Project is unwarranted. House Document No. 146 is a study setting forth an allocation of cost of the Central Valley Project as of February 1947. As a necessary part of the cost allocation process, assumptions as to physical conditions must be set forth. The study was made in 1946 and, as regards salinity control, assumed conditions in accordance with the only data then available--that presented in Bulletin No. 27. I consider that the obligations of the Central Valley Project are satisfied when a satisfactory quality of water is provided at the intakes to the Contra Costa and Tracy pumping plants.

The charts attached to this letter presents graphically--and, I believe, dramatically--the relation between salinity outflow and area protected against ocean water containing 1,000 parts of chlorine to 1,000,000 parts water. The charts are based on water quality data gathered since 1924 by the State Department of Water Resources and its predecessors. On the first chart, inflow in acre-feet during the 77-day period June 16-August 31 of each year is plotted against area affected by the stated degree of chlorine intrusion; the affected areas for each year are shown on the second chart. You will note that at about 20,000 acres, the line of water quantity turns sharply upward. In order to protect all of this last 20,000 acres, more than 3,000,000 acre-feet of fresh water must flow to Suisun Bay during the 77-day period. On an annual basis, this represents a duty of water of approximately 300 acre-feet per acre. If it is considered desirable to provide this 20,000-acre area with fresh-water--or to furnish municipal and industrial water of good quality to nearby areas--I am confident it can be done at far less cost in precious water supplies.

The fact that I disagree with the assumption that a barrier will conserve 2,600 second feet of outflow should not be construed as opposition to barriers. It is obvious from the excellent presentation in Bulletin No. 60 that there are many facets to the barrier problem. Please be assured that this Bureau will be happy--as we have been in the past--to cooperate in any way we can as your barrier studies continue. Our aim is the same as yours--to do what we can to aid maximum economical development of California's water resources. Consideration of barriers is an essential part of that development.

Sincerely yours,

Enclosures 2

C. H. Spencer
Regional Director

U.S. Secretary of the Interior Stewart L. Udall to
Ronald Reagan, Governor of California

January 9, 1969

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UNITED STATES
DEPARTMENT OF THE INTERIOR
Office of the Secretary
Washington, D.C. 20240

Dear Governor Reagan:

I am pleased to inform you that, with the exceptions and considerations stated below, I have approved the water quality standards of the State of California based upon my determination that they are consistent with the protection of the public health and welfare, the enhancement of the quality of the water, and the purposes of the Federal Water Pollution Control Act, as provided by Section 10(c)(3) of that Act. Accordingly, the standards are approved, which include thirty-one of the thirty-two Water Quality Control Policies submitted in June 1967, State Board Resolutions 67-36 through 67-41 and other adenda submitted by Mr. Irving Goldfeder's letter of November 21, 1967, and State Board Resolutions 68-16 and 68-17 submitted by Mr. George B. Maul's letter of November 21, 1968, are those applicable under the Act to the interstate waters of California. To clarify a difference in terminology, the State Board defined "Water Quality Control Policy" as used by the State to have the same meaning as "water quality standards" as used in the Federal Act. My approval of the California standards is based on this definition of terms.

I would like to commend your State Water Resources Control Board, its predecessor, the State Water Quality Control Board, and your Regional Water Quality Control Boards for a fine job of standards-setting and for their excellent cooperation in working with the Federal Water Pollution Control Administration in developing and revising the State's standards. The California standards are good ones, well documented and, with few exceptions, fully adequate to protect the quality and uses of your interstate waters. In particular, I am gratified by the adoption of a policy to protect high quality waters as a part of your State's enforceable standards. In my opinion, this policy, coupled with the high standards established for Lake Tahoe and certain other waters of your State, will prove to be of great value in conserving the present high quality of these waters for future generations.

During the past year, your State Water Resources Control Board and the Federal Water Pollution Control Administration have worked together to resolve differences over a number of items of the originally-submitted standards. Most of these issues have been resolved, and of those remaining I have excepted three items from my approval and recommended that certain actions be taken on the others.

C-12

I have excepted from approval the Water Quality Control Policy for Harbors, Marinas and Tidal Prisms of Los Angeles and Ventura Counties. I note that the Los Angeles Regional Water Quality Control Board has recently adopted significant changes of this policy, but that the State Board has not yet acted on these revisions. Therefore, I am deferring consideration of this policy pending completion of the State Board's action.

I have also excepted from approval all of the water quality objectives for temperature contained in the policies I have approved. These objectives are expressed in narrative terms or do not provide numerical temperature limits which we believe are necessary to effectively administer control over thermal pollution. I note that the State Board asked the State Department of Fish and Game to survey the present thermal character of interstate waters and to develop and recommend appropriate numerical temperature objectives. Further, I am informed that this study has been completed and that the State and Regional Boards will soon be considering the Fish and Game Department's recommendations. I am pleased with this positive approach, and we will look forward to receiving modifications of the temperature objectives.

Lastly, I have excepted from approval the minimum dissolved oxygen limit of 4.5 mg/l established for the nearshore coastal waters of the Santa Ana Region. We believe that a limit of 5 mg/l would more closely define natural water quality conditions, when not affected by deep ocean water upwelling, and would be consistent with the limits set for the other nearshore coastal waters of California. I recommend the adoption of this higher limit by your State and Regional Boards.

The Water Quality Control Policy for Sacramento-San Joaquin Delta adopted and submitted in June 1967 established salinity standards which we found inadequate to protect present municipal, industrial, agricultural and fishery uses. Because of the substantial Federal and local interest regarding this estuary, I appointed a Department of the Interior task force to consider this matter and, after hearing the Contra Costa representatives and studying other pertinent factors, this task force developed proposed salinity standards designed to protect existing water uses. These proposed standards were made available to your State Board for its consideration, and that body, after public hearings and staff evaluation, on October 24, 1968, adopted by Resolution 68-17 "The Supplemental Water Quality Control Policy for Sacramento-San Joaquin Delta." This Supplemental Policy augments and strengthens the salinity standards of the June 1967 Policy, but it differs significantly from the proposed standards which the Interior task force developed in that important water uses of the Delta are left unprotected. These are the spawning of striped bass and the municipal, industrial and agricultural water uses of the western part of the Delta. The State Board action recognized that further consideration of additional standards pertaining to these unprotected uses was necessary. Accordingly, the Board has stated that it will conduct public hearings during 1969 and will consider before June 30, 1970, the matter of supplementing the salinity standards now established.

In reliance upon your State Board's commitment and, of course, reserving the position of the United States as a participant in such hearings as the holder of water rights for the Central Valley Project, I have approved the Delta salinity standards as submitted as far as they go. In addition, the Bureau of Reclamation has analyzed prospective operating conditions for the Central Valley Project and related water projects that affect Delta supplies, and it has concluded that the Central Valley Project and related projects can be operated during the interim period indicated by the Interior task force (until September 30, 1972) to conform to the recommendations of the task force, including paragraphs B2 and B5, which provide the following:

> B2: Above Three Mile Slough in Sacramento River and between Jersey Point and Venice Island in San Joaquin and False Rivers, except in below normal dry and critical years, there shall be maintained a daily mean total dissolved solids concentration of:
>
> a. 350 milligrams per liter or less from April 1 until the water temperature at these locations reaches 60°F,
>
> b. 180 milligrams per liter or less thereafter for five weeks. This provision shall continue in effect until the initial operation of the Peripheral Canal at which time modification to enhance striped bass spawning in interior Delta channels shall be considered.
>
> B5: Within the normal operating capability of local, state and Federal water projects there shall be maintained at Antioch in the San Joaquin River until September 30, 1972 a mean total dissolved solids concentration of 450 milligrams per liter when measured on the basis of the average of the daily mean values for any 10 consecutive days throughout a period of at least 150 days each water year, except that the period is reduced to 120 days during dry years and 100 days during critical years; provided; that the criteria contained in this paragraph shall not apply when contractual arrangements regarding substitute supplies have been completed between the water users in the Delta and the State and the Federal governments.

The Bureau of Reclamation has proposed that the Central Valley Project be operated on this basis during the interim period (until September 30, 1972) to be monitored jointly by the Bureau and the Federal Water Pollution Control Administration, and I have concurred, so that existing water quality conditions in the Delta can be maintained. Upon the submission pursuant to the Federal Water Pollution Control Act by your State of additional standards for approval pursuant to that Act concerning the matters included in the task force's recommendations, the Department will, of course, review the situation as it may then appear. The Department must also reserve its freedom of action with respect to the operation of the Central Valley Project and under the Federal Water Pollution Control Act in the event additional standards are not forthcoming from your State on or before June 30, 1970.

I have approved the Water Quality Control Policy for the San Francisco Bay area on the basis that the soon-to-be-completed Bay-Delta study will lead to the development of a detailed implementation plan for better waste treatment and control than that now being accomplished and required. We recognize the significance of this study, and we understand that it will develop recommendations for a totally new and far-reaching water quality management program. We will expect that these recommendations will be incorporated in the San Francisco Bay area standards and submitted to the Department of the Interior as soon as this can appropriately be accomplished.

I am concerned about your State's waste treatment policies which allow the discharge of untreated and primary-treated wastes, digested sludge, oil field brines and heated wastes into certain confined waters, such as harbors and bays, and into certain nearshore waters. In my approval of the California standards, I have assumed that the non-degradation policy your State Board adopted will cause a review and modification of these policies and will lead to a revision of waste discharge requirements where appropriate. We therefore will expect that amendments to the implementation plans of your State's standards will be made and submitted to the Department of the Interior before January 1, 1970.

I would like to comment further on several other aspects of California's standards which I feel also need additional attention. For example, numerical bacteriological objectives have not been established for the Smith, Klamath and Colorado Rivers, the interstate streams of the Lahontan Region and Lake Topaz. These are prime recreation waters which we believe should be protected by specific bacteriological parameters. I understand that your State Department of Public Health is currently surveying these waters to develop appropriate numerical objectives for consideration by your State and Regional Boards. I urge early completion of this work and formal adoption of amendments for our consideration as Federal standards.

I also note that bacteriological objectives have not been established to protect sport fishing, boating and other secondary contact recreational uses in certain tidal waters such as the San Gabriel River tidal prism above Marine Drive, Los Cerritos Channel and Calleguas Creek tidal prisms and Hueneme and Channel Islands

Harbors. Your State Department of Public Health has established adequate bacteriological objectives and an excellent program of monitoring for public beaches and most other prime recreation waters. I recommend that a similar approach be taken in secondary contact recreational waters, and that appropriate bacteriological objectives be adopted for this purpose as early as possible.

Standards for the Lost River and specific standards for the minor interstate streams of the Lahontan Region were not included among the Water Quality Control Policies submitted by California. I understand, however, that a draft of a policy for the Lost River has been completed. I anticipate that Oregon will formulate standards for its portion of this river before June 30, 1969. Following this date, we would like to take action on the standards submitted by both States. Regarding the minor interstate streams of the Lahontan Region, I ask that specific standards be developed as soon as sufficient water quality data and other necessary information become available.

Finally, I would like to direct attention to two items for future consideration regarding the New and Alamo Rivers. When the discharge of untreated wastes into the New River by Mexicali, Mexico, has been corrected, an upgrading of the Water Quality Control Policies for these two rivers would be appropriate. I believe that the present requirement of a minimum of primary waste treatment should be raised to secondary treatment, and that bacteriological criteria to protect secondary contact recreational and other incidental contact uses of these waters should be established. These features would facilitate full usage of the New and Alamo Rivers as well as enhance the water quality and uses of the Salton Sea. I would appreciate careful consideration of these recommendations by your State and Regional Boards.

Successful implementation of the standards is the key to accomplishing our mutual goals of protecting and enhancing the quality and productivity of interstate waters. Adherence to the waste treatment requirements and time schedules specified in your State's implementation plans is very important if we are to achieve these goals. The annual State program plan, which your State Water Resources Control Board prepares and submits to the Federal Water Pollution Control Administration in connection with our grant program can provide a basis for updating information on the status of implementing the standards.

Lastly, it is evident that our waste treatment and water pollution control technology will advance and knowledge of water quality data will make more information available to assure more accurate assignment of water quality objectives. As this new knowledge becomes available, we will further expect to cooperate with the State of

California in making necessary amendments to the standards that have been theretofore approved. It will be our pleasure to continue to work together to protect, upgrade and enhance the quality of the waters of your State.

Sincerely yours,

(Sgd) Stewart L. Udall
Secretary of the Interior

Honorable Ronald Reagan
Governor of California
Sacramento, California 95814

U.S. Bureau of Reclamation Regional Director
R. J. Pafford, Jr. to Winfred W. Adams,
Chairman, State Water Resources Control Board

November 2, 1972

C-18

UNITED STATES DEPARTMENT OF THE INTERIOR
Bureau of Reclamation
Sacramento, California 95825

November 2, 1972

Mr. Winfred W. Adams, Chairman
State Water Resources Control Board
1416 Ninth Street
Sacramento, California 95814

Dear Chairman Adams:

I understand that one of the matters that you will be considering today, November 2, 1972, is the interim implementation of B-2 and B-5 water quality criteria as specified in the Secretary of Interior's letter to the Governor of California dated January 9, 1969.

As you realize, these criteria were developed for an interim period by a Federal interagency task force. This interim period expired September 30, 1972, because the analysis made by the Bureau of Reclamation in 1968 indicated that there was reasonable assurance these criteria could be met only until 1972. However, subsequent buildup in water use from the Central Valley Project has been slower than originally estimated. We recognize the beneficial uses which the Delta water system supports; therefore, on October 6, 1972 I instructed the Central Valley Operations Office to operate the Central Valley Project to meet its share of the B-2 - B-5 criteria (copy attached). Based upon our present analysis, we expect that Project will be able to meet these criteria during the next 3 to 5 years and we will operate to meet these criteria for that period of time or until water quality standards applicable to the operation of the Central Valley Project are established.

When I instructed our operators to operate the Project to meet the B-2 - B-5 criteria I had in mind that we would make exceptions for special study cases, such as the one requested last summer by the California Department of Fish and Game concerning striped bass.

I would hope that the State Department of Water Resources is in a comparable position to help meet these criteria.

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Attached is a copy of the B-2 - B-5 criteria.

Sincerely,

R. J. Pafford, Jr.
Regional Director

Enclosures (2)

Copy to: Mr. William R. Gianelli, Director
Department of Water Resources

Environmental Protection Agency
San Francisco, California

B-2:

[See Secretary of Interior's letter Supra]

B-5:

[See Secretary of Interior's letter Supra]

UNITED STATES DEPARTMENT OF THE INTERIOR
Bureau of Reclamation
Sacramento, California 95825

October 6, 1972

To: Chief of Operations, Sacramento, CA

From: Regional Director, Sacramento, CA

Subject: Delta Quality Criteria

We are presently operating to meet quality criteria in the Delta as defined in the State Water Resources Control Board Resolution No. 68-17 adopted in 1968. In addition, we have been using the Secretary's so-called "B-2" and "B-5" stipulations in approving the report of the Delta Water Quality Standards Task Force.

Standards B-2 and B-5 expired this year. You are instructed to continue to operate to meet the B-2 and B-5 criteria until further notice unless specifically modified by me.

Copy to: MP-700
MP-400

Fig. 1 The Delta and Major Water Projects in California

This 11 x 17 two color figure is available upon request from:

John M. MacDiarmid
Brown and Caldwell
1501 North Broadway
Walnut Creek, CA 94596